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ABSTRACT

This document, one of eight in a multi-cultural competency-based vocational/technical curricula series, is on machine trades. This program is designed to run 36 weeks and cover 6 instructional areas: use of measuring tools; benchwork/tool bit grinding; lathe work; milling work; precision grinding; and combination machine work. A duty-task index lists competencies in each instructional area that the student should be able to perform at the end of the program. For example, in the milling and precision grinding section, a student should be able to (1) machine an edge finder; (2) machine a V-block; (3) machine a V-block yoke; (4) machine 1-2-3 blocks; and (5) machine an angle plate. In section 1, each instructional task area contains a list of performance objectives, evaluation criterion, performance guide, and a list of tasks to be covered. In section 2, the introduction and duty-task index is repeated in English, Spanish, and Laotian. Section 3 lists technical terms concerning machine trades in English, Spanish, and Laotian. (CT)

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Multi-cultural Competency-based Vocational Curricula

Illinois
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Adult,
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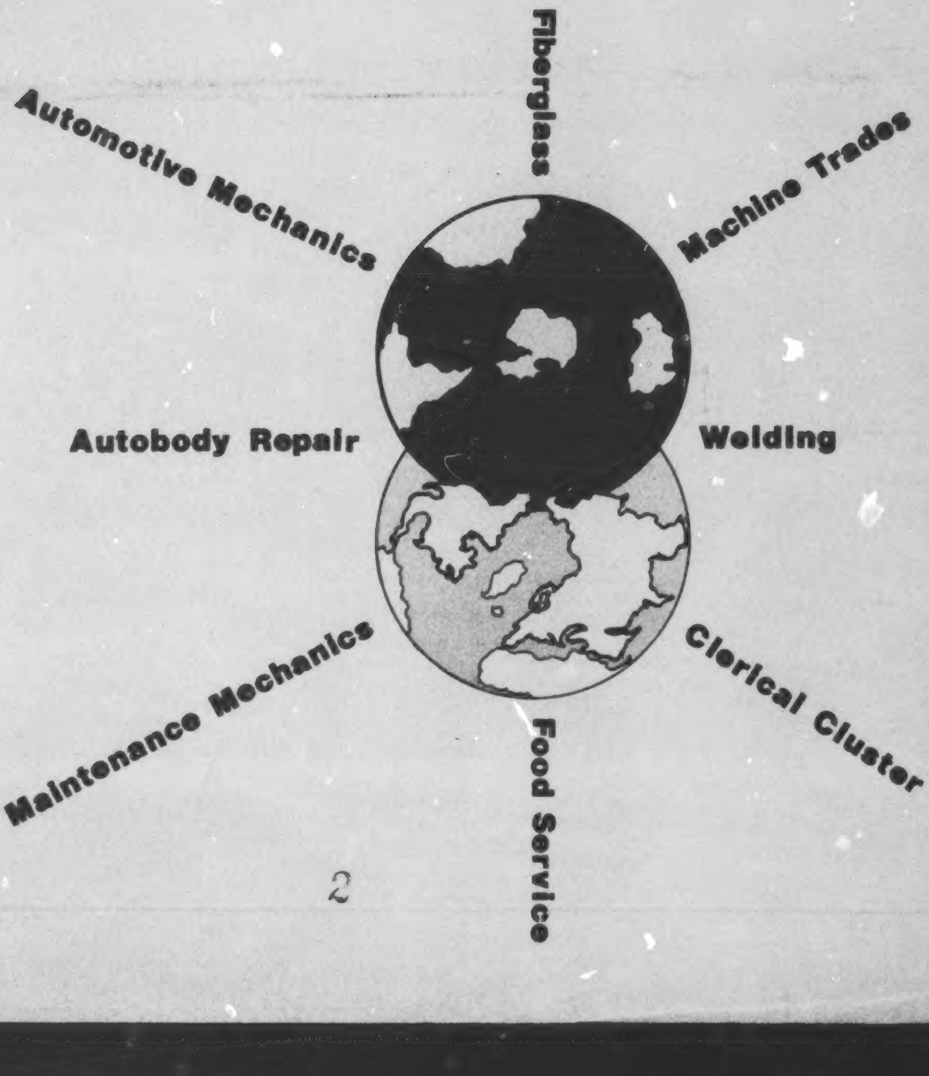
ED205787

CE029 811


Fiberglass
Automotive Mechanics
Machine Trades
Autobody Repair
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June 1981

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    MACHINE TRADES

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    Spanish
    Laotian

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    English/Spanish
    English/Laotian

ILLINOIS STATE BOARD OF EDUCATION

Department of Adult, Vocational and Technical Education
Research and Development Section

Product Abstract

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___ 04 Distributive Education
___ 07 Health Occupations Education
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___ 10 Industrial Art Education
___ 16 Technical Education
X 17 Trade and Industrial Education
___ 22 Cooperative Education
___ Career Education
___ Other (Specify) ___

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X Post-Secondary X Adult X Teacher (Pre-Service)
X Administrator (Pre-Service) ___ Other Specify) ___

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16. General Description (State the general objective and suggested method of use. Summarize the content and tell how it is organized. Continue on back of this sheet or on another sheet, if necessary.):

MACHINE TRADES series contains:

1. Competency-Based Curriculum in VESL.
2. Program Introduction and Outline in English; Laotian; and Spanish.
3. Lexicon of Technical Terms in VESL; English-Laotian; and English-Spanish versions.

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COMPETENCY-BASED CURRICULUM SERIES

MACHINE TRADES

CAREER DEVELOPMENT CENTER
SCHOOL OF TECHNICAL CAREERS
SOUTHERN ILLINOIS UNIVERSITY
CARBONDALE, ILLINOIS

COMPETENCY-BASED VOCATIONAL/TECHNICAL CURRICULUM SERIES

MACHINE TRADES

MASAKO T. SHIN, CURRICULUM SPECIALIST, STC, SIU-C

The preparation of this multicultural series was aided financially through funding agreements with the Illinois State Board of Education/Department of Adult, Vocational and Technical Education.

(Contract Numbers: R-33-10-C-0442-400, R-33-21-J-0542-400)

June 1981

ARDEN L. PRATT, DEAN
E. HOLLIS MERRITT, ASST. DEAN
LARRY HEPBURN, CENTER DIRECTOR

OUR GOAL

TO ACHIEVE THE MAXIMUM IN THE MINIMUM TIME

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INTRODUCTION

The Machine Trades program runs 36 weeks and covers the following training areas: use of measuring tools; benchwork/tool bit grinding; lathe work; milling work; precision grinding; and combination machine work.

The class meets 2 hours each day in a related education class (a basic education program to improve the student's reading/English/mathematics skills necessary for vocational training and for adequate performance at the entry level of employment) or in a GED class (a general education development program to prepare for a high school equivalency test), 1 hour in a shop theory class, and 5 hours in shop work.

During the course of training, the student will learn to perform one or a variety of duties, as a production machine operator, a machine tool operator and/or a machinist apprentice, depending on the student's aptitude, interest, and progress in class.

A prospective student for the machine trades needs, most of all, to possess a determination to acquire the development of the hands, ears, eyes, and the mind to do, to listen, to remember, and to reason.

Training in the Machine Trades can begin with the very basic and elementary principles and methods and advance, step by step, to various stages of application. However, the student must remember that a machine is only a tool for a machinist to work with, and that knowing how to operate the machine alone is never sufficient to become a good machinist.

A successful candidate for Machine Trades must have the following personal attributes: orderliness, respect for a machine, accuracy, efficiency, judgement, and confidence.

Upon successful completion of the training program, an above-average student will earn the equivalent of one year in apprentice training as a machinist and find job opportunities waiting in a wide range of industries.

MACHINE TRADES: DUTY-TASK INDEX

I. BENCHWORK AND DRILL PRESS

1. Machine a drill grinding gage.
2. Machine 1/16" through 1/2" drill gage (29 holes).
3. Machine tool bit grinding gage.

II. GRINDING WORK

1. Practice tool bit grinding.

III. LATHE WORK

1. Practice the turning operation.
2. Work a practice piece - turning operation.
3. Machine a slide hammer. (Optional)
4. Machine a screw (Part A) for a planer jack.
5. Machine a screw (Part B) for a planer jack.
6. Machine a coupling (Part C) for a planer jack.
7. Machine a cone for a planer jack.
8. Machine a base for a planer jack.
9. Machine a mandrel (Part D) for a planer jack.
10. Machine a spindle-shaft test bar.
11. Machine an extender for a planer jack.

IV. MILLING MACHINE AND GRINDING WORK

1. Machine two step blocks.
2. Machine a body for a machinist vise.
3. Machine a movable jaw for a machinist vise.
4. Machine a plate (slide) for a machinist vise.
5. Machine a jaw face for a machinist vise.
6. Machine a vise screw for a machinist vise.
7. Machine a vise handle for a machinist vise.

V. MILLING AND PRECISION GRINDING WORK

1. Machine an edge finder.
2. Machine a V-block.
3. Machine a V-block yoke.
4. Machine 1-2-3 blocks.
5. Machine an angle plate.

DUTY: BENCHWORK AND DRILL PRESS

TASK: Machine a drill grinding gage.

Performance Objectives:

Given a print for Project I-I, tools and materials, the student will machine a drill grinding gage according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

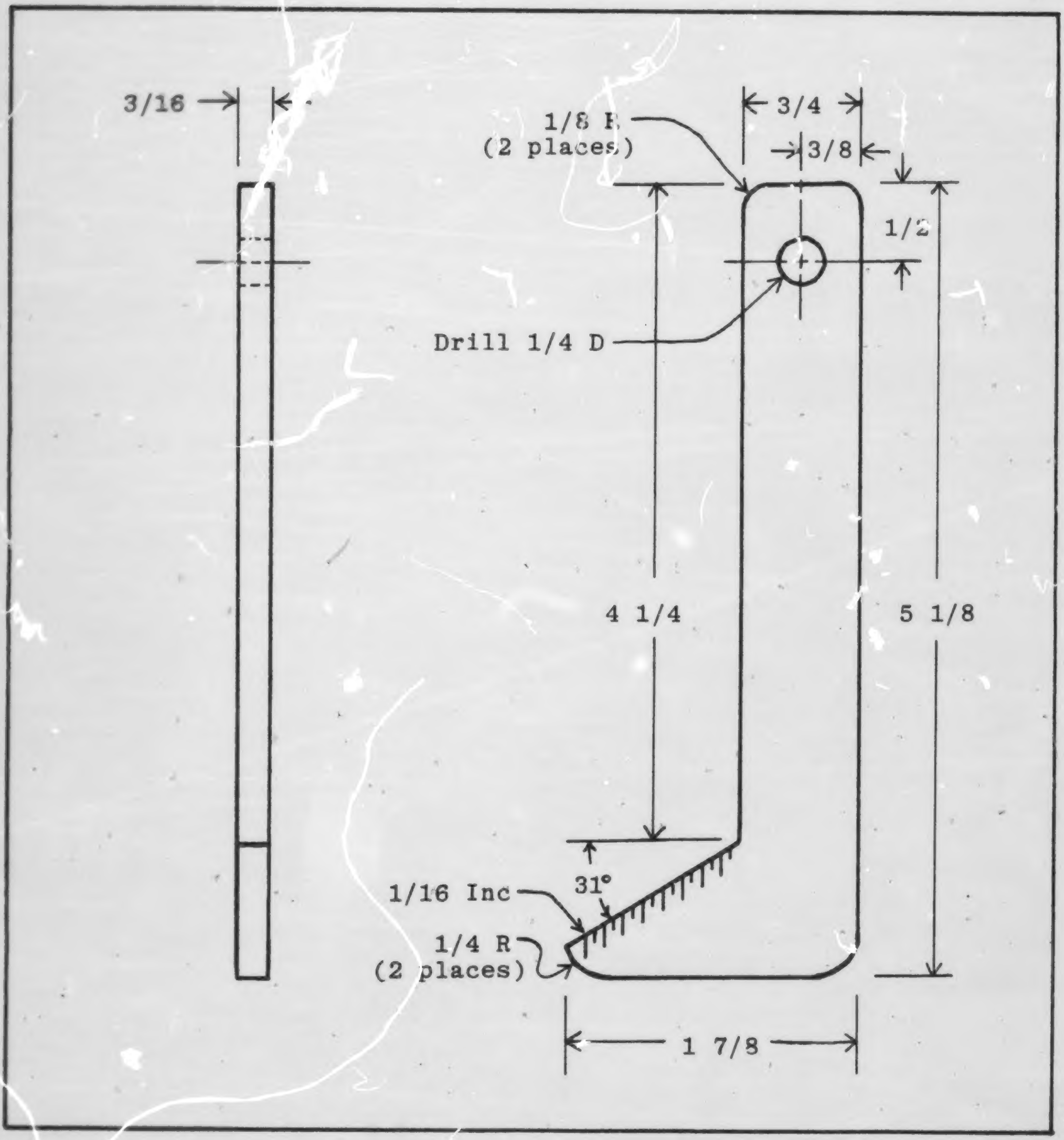
1. Study the print carefully and select appropriate tools and materials for the job.
2. Cut stock to a required length with cut-off saw.
3. Square one end with file.
4. Lay out the part to linear and angular dimensions using a square-scribe and protractor.
5. Using a square and scribe, lay out and center a punch for 1/4" diameter hole.
6. With hacksaw, saw on the outside of the scribed lines.
7. File all surfaces square, parallel and angular as required by print.
8. Lay out 1/8" and 1/4" radius.
9. File radius to line. Check with radius gage.
10. Set correct RPM on drill press.
11. Pick up the center punch, march and drill 1/4" diameter hole.
12. Chamfer the hole with countersink.
13. Finish-grind the piece on surface grinder.
14. Break all sharp edges.
15. Set up vertical mill and scribe in 1/16" graduations as required by print.
16. Have the instructor check your work.
17. Clean up the work area and return all the supplies to the storage area.

BENCHWORK AND DRILL PRESS

Project Number: I-1

Project Title: Drill Grinding Gage

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


3/16
3/4
1/8 R
(2 places)
3/8
1/2
Drill 1/4 D
4 1/4
5 1/8
31°
1/16 Inc
1/4 R
(2 places)
1 7/8

DUTY: BENCHWORK AND DRILL PRESS

TASK: Machine 1/16" through 1/2" drill gage (29 holes).

Performance Objectives:

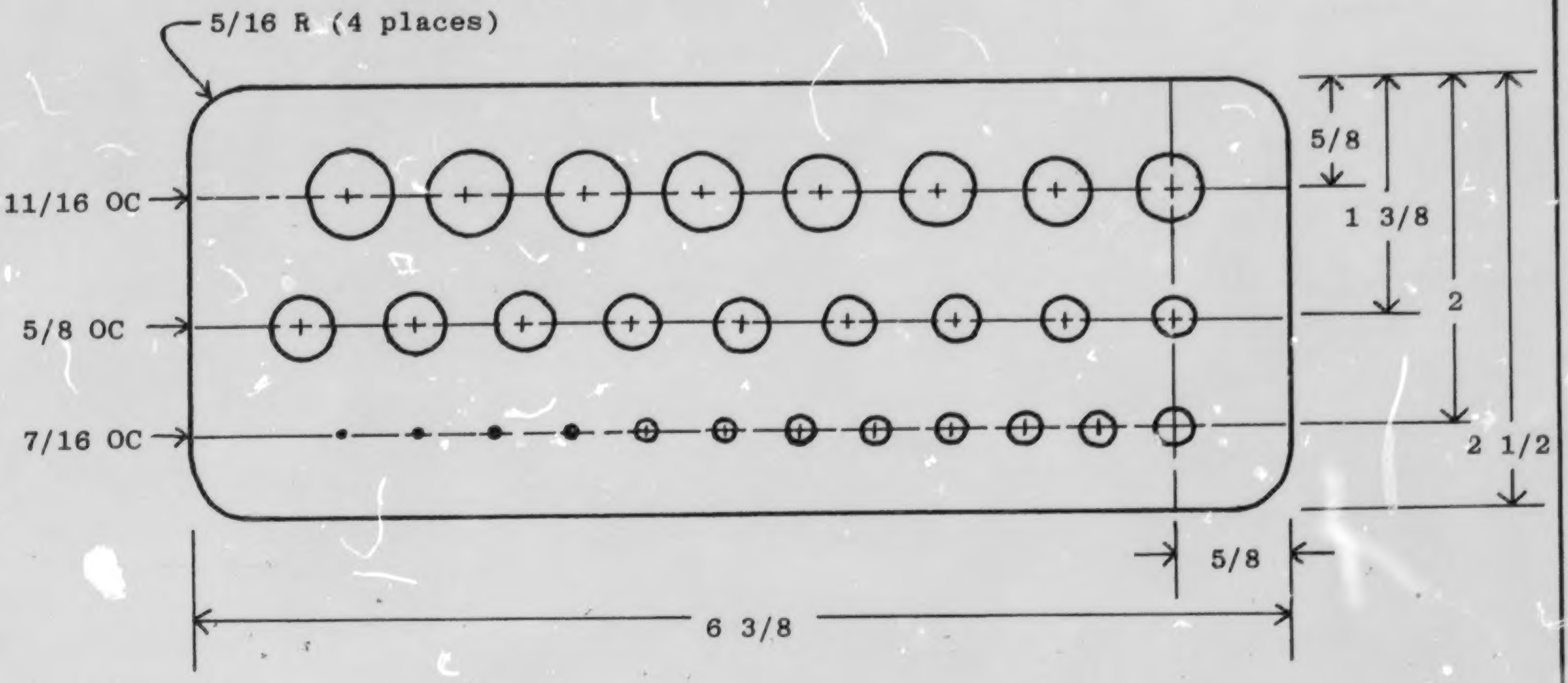
Given a print for Project I-2, tools and materials, the student will machine 1/16" through 1/2" drill gage according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Study the print carefully and select appropriate tools and materials for the project.
2. Cut stock to a required length with cut-off saw.
3. Square one end with file.
4. Using a square and scribe, lay out the length.
5. Using a radius gage and scribe, lay out the required radii.
6. File in all radii. Check with radius gage.
7. Lay out the scribed lines as required to locate holes; use a square, scribe and dividers.
8. Center-punch the hole locations.
9. Using a correct RPM, drill all holes as required by print.
10. Chamfer all holes.
11. Finish-grind the piece on surface grinder.
12. Stamp a correct hole size opposite each hole.
13. Clean up the work area and return all the supplies to the storage area.
14. Have the instructor check your work.


5/16 R (4 places)
11/16 OC
5/8 OC
7/16 OC
5/8
1 3/8
2
2 1/2
5/8
6 3/8

BENCHWORK AND DRILL PRESS

Project Number: I-2

Project Title: 1/16" through 1/2" Drill Gage - 29 Holes

Material: C.R.S.
Scale: Full
Tolerance: Frac. (±1/64) Dec. (± .005) Ang. (± 1/2°)

DUTY: BENCHWORK AND DRILL PRESS

TASK: Machine tool bit grinding gage.

Performance Objectives:

Given a print for Project I-3, tools and materials, the student will machine a tool bit grinding gage according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

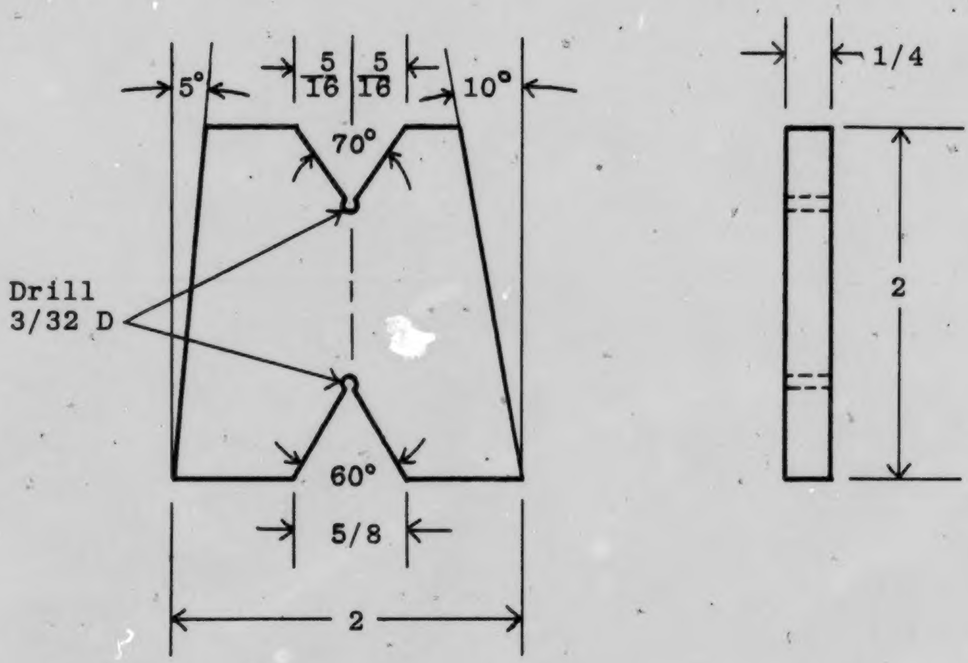
1. Study the print and select appropriate tools and materials for the job.
2. Cut stock to a required length using cut-off saw.
3. Square one end with file.
4. Lay out the length.
5. File square to the correct length.
6. Using a square and scribe, lay out all angular 3/32" diameter holes.
7. Using a protractor and scribe, lay out all angular dimensions.
8. Set drill press to a correct RPM.
9. Drill 3/32" diameter holes.
10. Using a hacksaw, saw close to all angular layout lines.
11. Using correct files, file angular dimensions as required. Check each angle with a level protractor.
12. Finish-grind on surface grinder.
13. Stamp the part as required by print.
14. Clean up the work area and return all the supplies to the storage area.
15. Have the instructor check your work.

BENCHWORK AND DRILL PRESS

Project Number: I-3

Project Title: Tool Bit Grinding Gage

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


5°
5/16
5/16
10°
70°
Drill
3/32 D
60°
5/8
2
1/4
2

DUTY: GRINDING WORK

TASK: Practice tool bit grinding.

Performance Objectives:

Given a demonstration, information and necessary supplies, the student will practice grinding tool bits according to instructions.

Evaluation Criterion:

The student will practice grinding tool bits to the satisfaction of the instructor.

Performance Guide:

1. Saw off 30 pieces of C.R.S. 5/16" x 5/16" x 2 1/2", using a vertical bandsaw.
2. Practice grinding the tool bits, as shown and instructed, using the pattern tool bits and tool bit grinding gage as reference to check the front clearance, side clearance, side angles, back rake and side rake.
3. Work one bit for each of the following types of tool bits:
   a. One right-hand all purpose 60° turning tool for mild steel.
   b. One right-hand 70° rough turning tool for tool steel.
   c. One right-hand turning tool with chip rake.
   d. One facing tool with chip rake.
   e. One offset necking tool and cut-off tool.
   f. One straight 60° national form turning tool.
   g. One offset 60° national form threading tool.
   h. One boring bar.
4. All tool bits must be properly honed as shown.
5. Clean up the work area and return the supplies to the storage area.
6. Have the instructor check your finished work.

DUTY: LATHE WORK

TASK: Practice the turning operation.

Performance Objectives:

Given a print for Project III-1, materials, and equipment, the student will work 3 pieces to practice the turning operation.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Study the print and select appropriate materials and tools for the task.
2. Cut off the stock in cut-off saw. Saw 1 1/4" longer so as to hold in three-jaw chuck.
3. Face off the workpiece.
4. Center-drill the workpiece.
5. Turn down large diameter.
6. Turn down small diameter.
7. Turn to shoulder.
8. Face off the shoulder.
9. Chamfer.
10. Drill tap drill size.
11. Tap in lathe.
12. Cut off in lathe.
13. Face to length.
14. Chamfer end.
15. Have the instructor check your work.
16. Clean up the work area and return the supplies to the storage area.

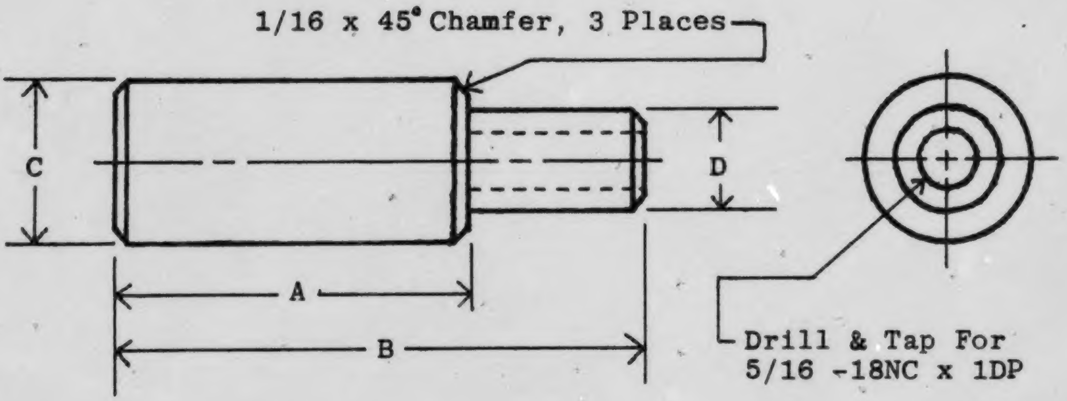
LATHE WORK

Project Number: III-I

Project Title: Practice Lathe Project 1

Material: C.R.S.
Tolerance: Frac. (± 1/64") Dec. (± .005")
Requirement: Work one piece each #1, #2, #3.

spec. work	A	B	C	D
#1	2"	3"	.937"	.562"
#2	2 3/32"	3 3/32"	.911"	.584"
#3	1 15/16"	3 5/32"	1.067"	.637"


1/16 x 45° Chamfer, 3 Places
C
D
A
B
Drill & Tap For
5/16 -18NC x 1DP

DUTY: LATHE WORK

TASK: Work a practice piece - turning operation.

Performance Objectives:

Given a print for Project III-2, materials and equipment, the student will work a piece to practice the turning operation on lathe.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

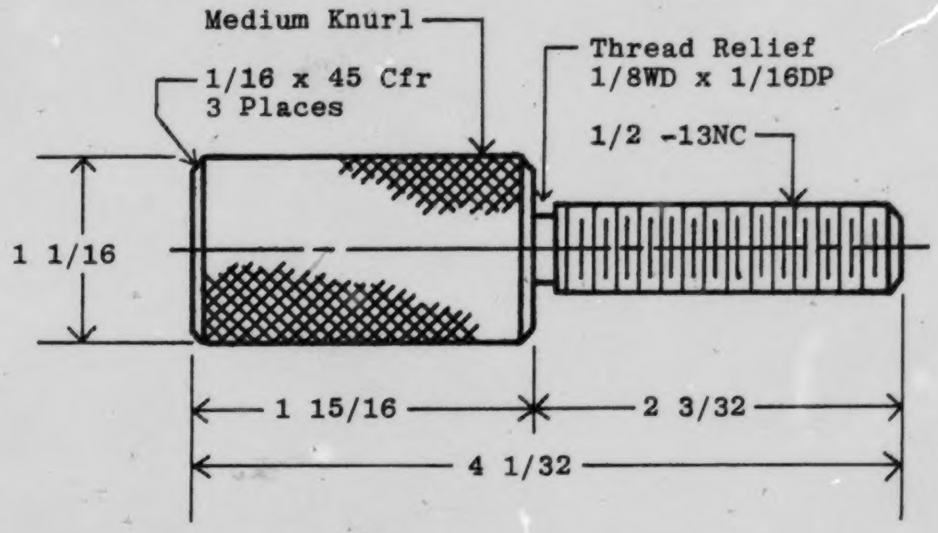
1. Cut off the stock in cut-off saw. Saw 1 1/4" longer so as to hold in a four-jaw chuck.
2. Face off one end.
3. Center-drill.
4. Turn 1 1/16" diameter.
5. Knurl 1 15/16" in length.
6. Turn 1/2" diameter for thread.
7. Chamfer 2 places.
8. Cut thread relief.
9. Thread 1/2 - 13 national course thread.
10. Cut off length with a cutoff tool.
11. Face off the opposite end to the correct size and chamfer.
12. Have the instructor check your work.
13. Clean up the work area and return all the supplies to the storage area.

LATHE WORK

Project Number: III-2

Project Title: Practice Lathe Project 2

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (.005") Ang. (1/2°)


Medium Knurl
1/16 x 45 Cfr
3 Places
Thread Relief
1/8WD x 1/16DP
1/2 -13NC
1 1/16
1 15/16
2 3/32
4 1/32

DUTY: LATHE WORK

TASK: Machine a slide hammer. (Optional)

Performance Objectives:

Given a print for Project III-3A, III-3B, III-3C, and III-3D, tools and materials, the student will machine a slide hammer according to specifications, but without any procedural guide.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor within a length of time considered reasonable.

Performance Guide:

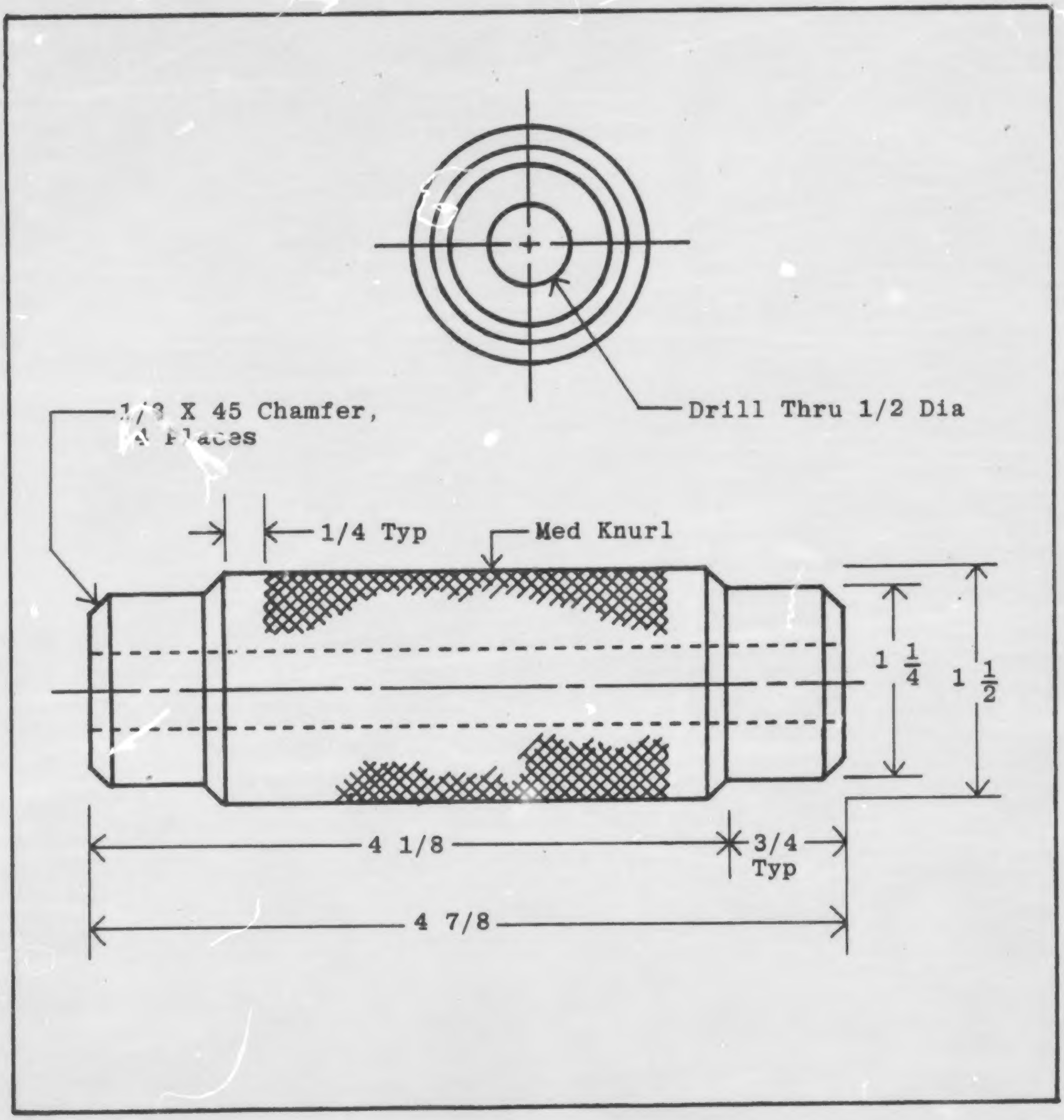
1. Study the prints carefully and select the appropriate tools and materials for the job.
2. Review the shop operational steps for the previous projects.
3. Outline workable shop operation steps for the project.
4. Work the pieces.
5. Have the instructor check your work.
6. Clean the work area and return all the supplies to the storage area.

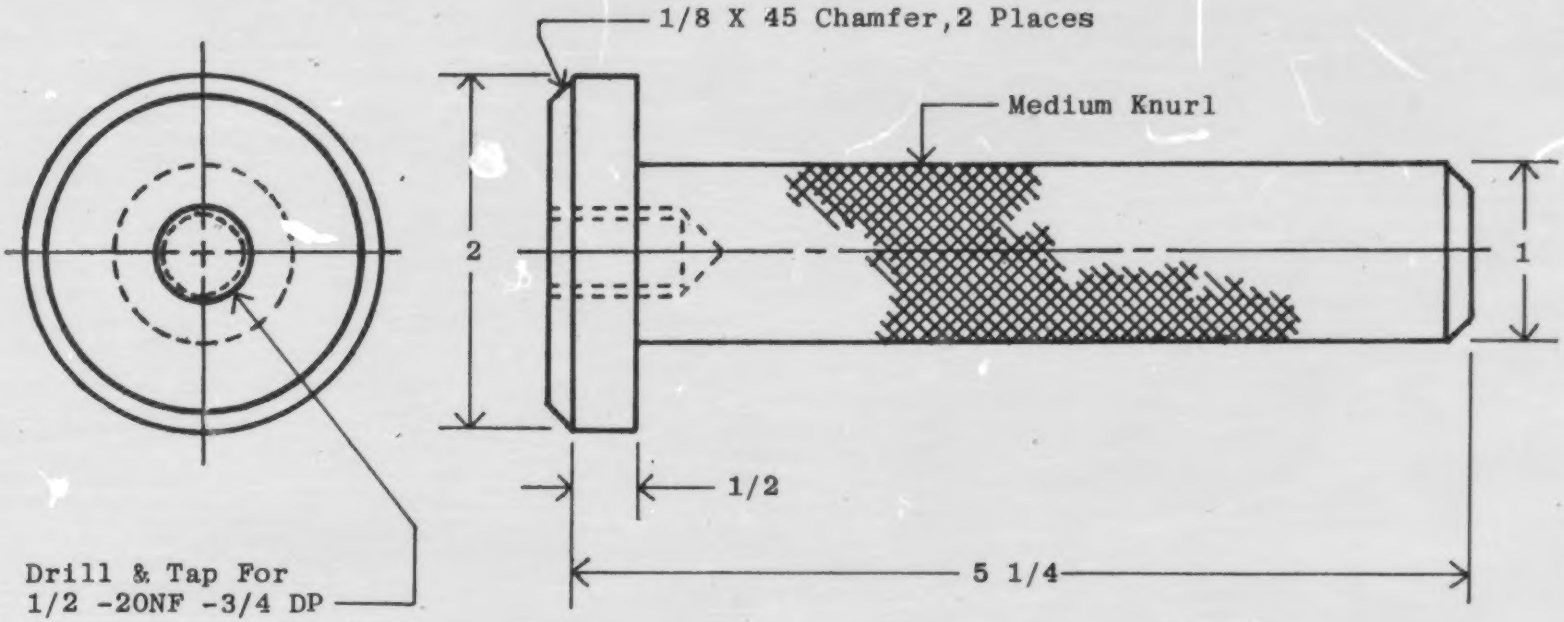
LATHE WORK

Project Number: III-3A

Project Title: Slide Hammer

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2")


Drill Thru 1/2 Dia
1/8 X 45 Chamfer, 4 Places
1/4 Typ
Med Knurl
1 1/4
1 1/2
4 1/8
3/4 Typ
4 7/8


1/8 X 45 Chamfer,2 Places
Medium Knurl
2
1
1/2
5 1/4
Drill & Tap For
1/2 -20NF -3/4 DP

LATHE WORK

Project Number: III-3B

Project Title: Slide Hammer

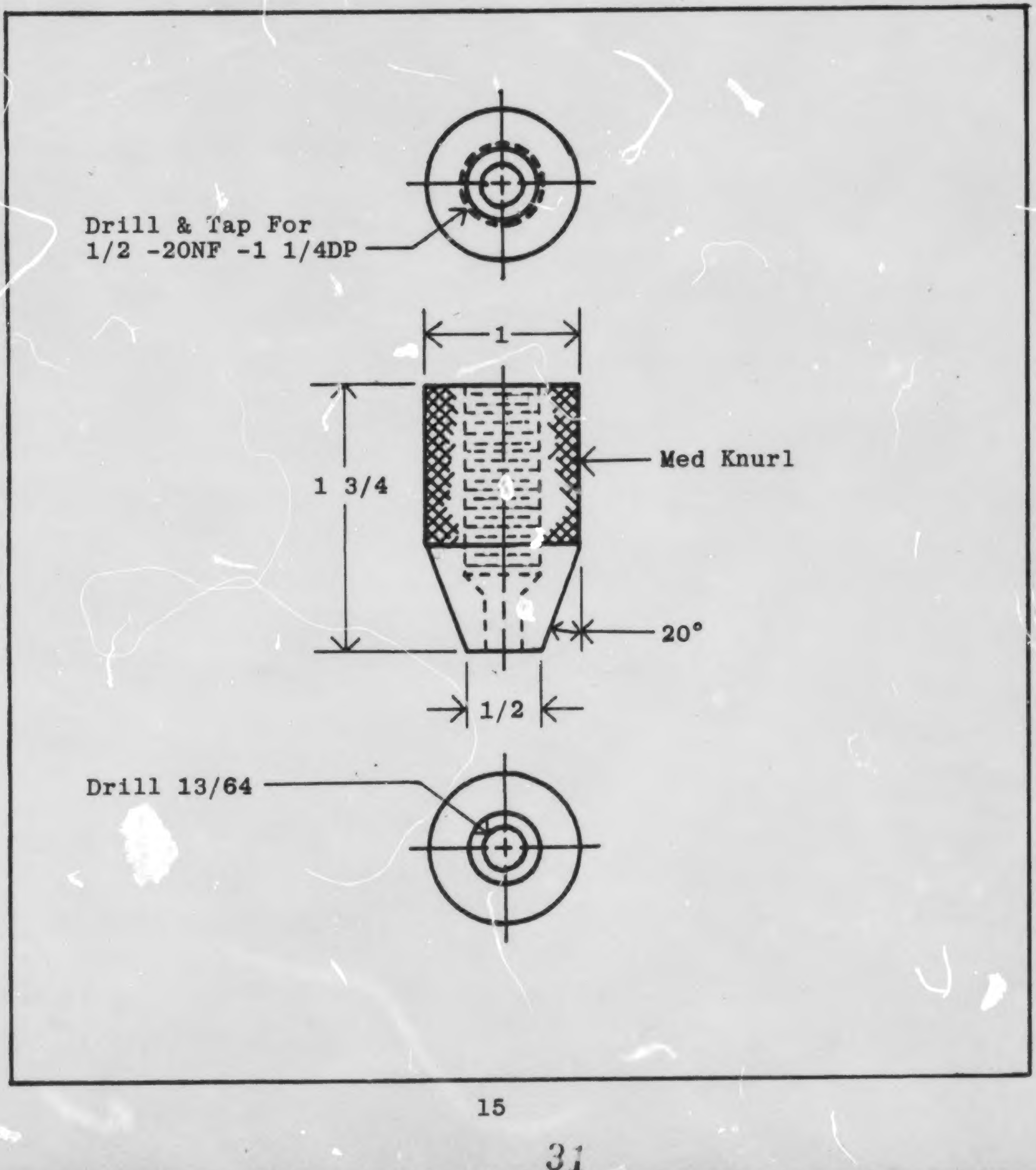
Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)

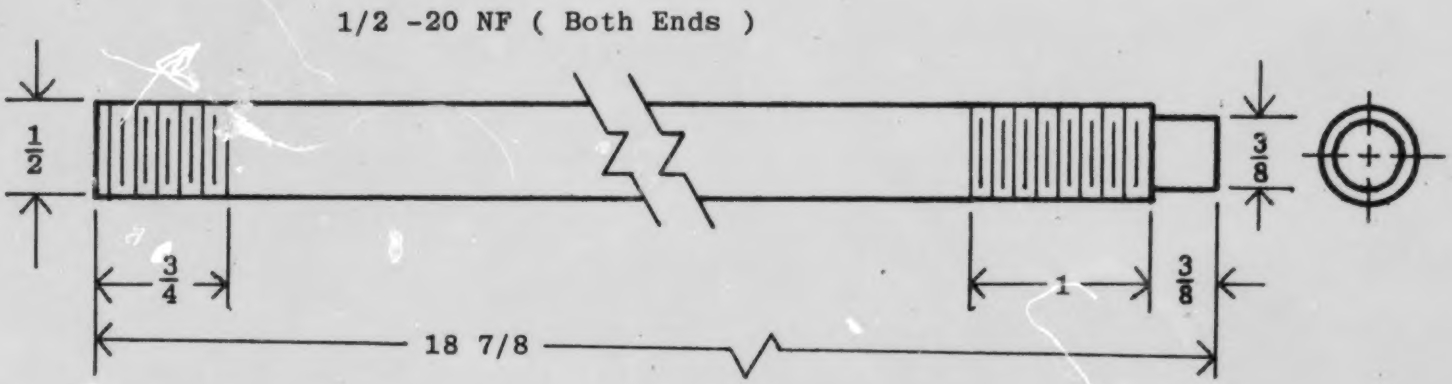
LATHE WORK

Project Number: III-3C

Project Title: Slide Hammer

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2")


Drill & Tap For
1/2 -20NF -1 1/4DP
1
1 3/4
Med Knurl
20°
1/2
Drill 13/64


1/2 -20 NF (Both Ends)
1/2
3/4
18 7/8
1
3/8
3/8

LATHE WORK

Project Number: III-3D

Project Title: Slide Hammer

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)

DUTY: LATHE WORK

TASK: Machine a screw (Part A) for a planer jack.

Performance Objectives:

Given a print for Project III-4A, materials, and equipment, the student will make a screw for a planer jack.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

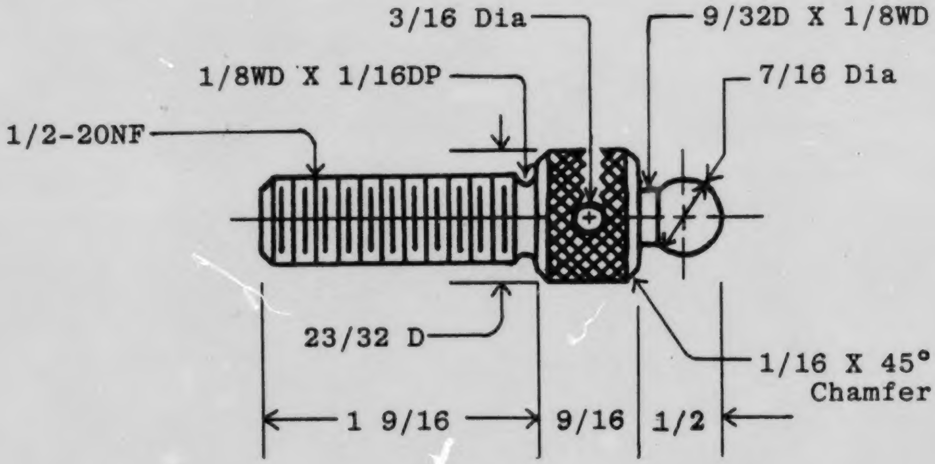
1. Cut off the stock in cutoff saw 1 1/4" longer so as to hold in four-jaw chuck.
2. Indicate the piece to run true.
3. Face off one end.
4. Center-drill.
5. Turn 23/32" diameter.
6. Knurl.
7. Turn 1/2" diameter for thread 1 9/16" length and face shoulder.
8. Chamfer 2 places.
9. Cut the thread relief.
10. Thread 1/2 - 20 national fine (N.F.) thread.
11. Cut off with a cutoff tool.
12. Make a female adapter to hold the part for work on the opposite end.
13. Face opposite end.
14. Turn 7/16" diameter straight.
15. Chamfer 1 place.
16. Use necking tool to cut neck for the ball.
17. Use forming tools to cut correct radius to form ball.
18. Use ball wiggler to locate center for 3/16" diameter hole. This work is done in the milling machine.
19. Drill a 3/16" hole through.
20. Have your work checked by the instructor.
21. Clean up the work area and return the supplies to the storage area.

LATHE WORK

Project Number: III-4A

Project Title: Planer Jack - Part A (Screw)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


3/16 Dia
9/32D X 1/8WD
1/8WD X 1/16DP
7/16 Dia
1/2-20NF
23/32 D
1/16 X 45° Chamfer
1 9/16
9/16
1/2

DUTY: LATHE WORK

TASK: Machine a screw (Part B) for a planer jack.

Performance Objectives:

Given a print for Project III-4B, materials and equipment necessary, the student will make a screw for a planer jack.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

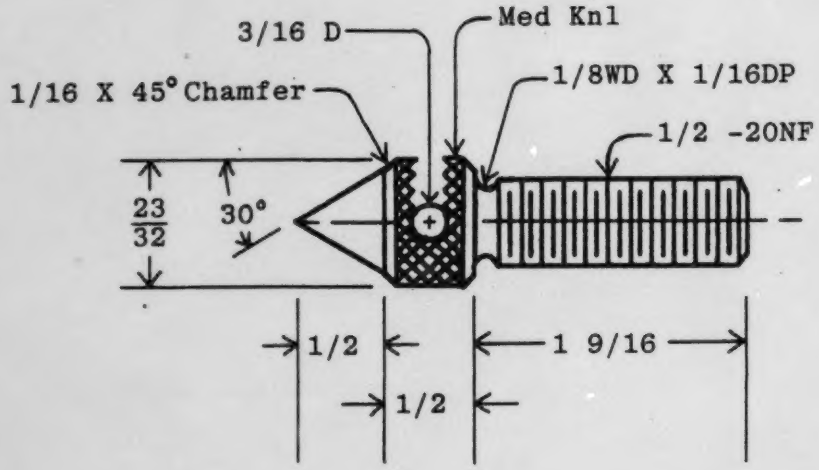
1. Cut off the stock in cutoff saw 1 1/4" longer so as to hold in four-jaw chuck.
2. Indicate the piece to run true.
3. Face off one end.
4. Center-drill.
5. Turn 23/32" diameter.
6. Knurl.
7. Turn 1/2" diameter for thread 1 9/16" length and face shoulder.
8. Chamfer two places.
9. Cut thread relief.
10. Thread 1/2" - 20 national fine (N.F.) thread.
11. Cut off with cutoff tool.
12. Use a female adapter that was made for Project III-4A to machine the opposite end.
13. Place in collet chuck.
14. Face the opposite end.
15. Turn to 21/32" to allow for chamfer.
16. Swivel compound to 45°.
17. Cut 1/16" x 45° chamfer.
18. Swivel compound to 30°.
19. Cut 30° angle with compound.
20. Have the instructor check your work.
21. Clean up the work area and return the supplies to the storage area.

LATHE WORK

Project Number: III-4B

Project Title: Planer Jack - Part B (Screw)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


3/16 D
Med Knl
1/8WD X 1/16DP
1/16 X 45° Chamfer
1/2 -20NF
23/32
30°
1/2
1/2
1 9/16

DUTY: LATHE WORK

TASK: Machine a coupling (Part C) for a planer jack.

Performance Objectives:

Given a print for Project III-4C, materials, and equipment, the student will make a coupling for a planer jack.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

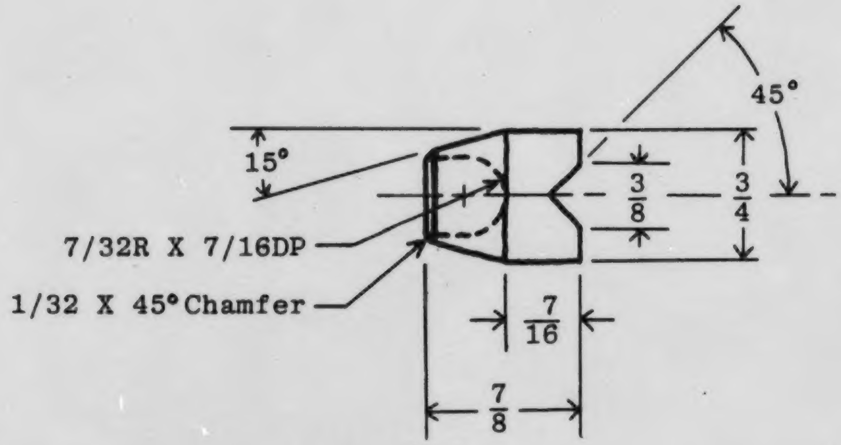
1. Cut off the stock in cutoff saw 1" longer in length so as to hold in milling machine.
2. Swivel head of mill 45°; place the milling cutter in collet. Clamp the part in vise and V-block.
3. Mill 45° angle.
4. Saw off excess metal on band saw.
5. Place the part in lathe, holding it in a collet chuck.
6. Face off one end.
7. Center-drill.
8. Drill with a 7/16" drill 15/32" deep measuring from the point of drill.
9. Use 7/16" ball end mill to complete radius.
10. Swivel compound and cut 15° angle.
11. Swivel compound 45° and cut 45° chamfer.
12. Take the piece out and place the opposite end back in collet chuck.
13. Place the ball end of Part A (screw) inside the female radius of Part C (coupling), holding Part A parallel by use of tailstock center.
14. Use crimping tool to crimp Part A and C together.
15. Have the instructor check your work.
16. Clean up the work area and return the supplies to the storage area.

LATHE WORK

Project Number: III-4C

Project Title: Planer Jack - Part C (Coupling)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


45°
15°
3/8
3/4
7/32R X 7/16DP
1/32 X 45° Chamfer
7/16
7/8

39

DUTY: LATHE WORK

TASK: Machine a cone for a planer jack.

Performance Objectives:

Given a print for Project III-4F and the necessary materials and equipment, the student will work the cone for the planer jack.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Cut off the stock in cutoff saw 2" longer to allow for work with knurling tool.
2. Indicate the piece true in lathe.
3. Face one end.
4. Center-drill.
5. Turn 1.375 diameter.
6. Swivel compound and turn 20° angle; also 13/16" diameter at same operation.
7. Knurl 11/16" portion in length.
8. Drill the piece at least 1 7/8" deep with 29/64" drill.
9. Tap with 1/2 - 20 tap: the depth of threads at least 1 9/16" deep.
10. Counterbore .750" diameter; .135" deep.
11. Swivel compound 20°.
12. Turn 20° angle to inner edge of .750 diameter.
13. Counterbore 1.005 diameter; .135 deep.
14. Break all sharp edges and polish the part.
15. Cut off the part to size with cutoff tool leaving 1/64" for facing.
16. Screw the part on male adapter; indicate true in four-jaw chuck and indicator.
17. Face to size.
18. Chamfer 1/16" x 45° and break sharp edges on inside diameter.

DUTY: LATHE WORK

TASK: Machine a cone for a planer jack.

Performance Guide:

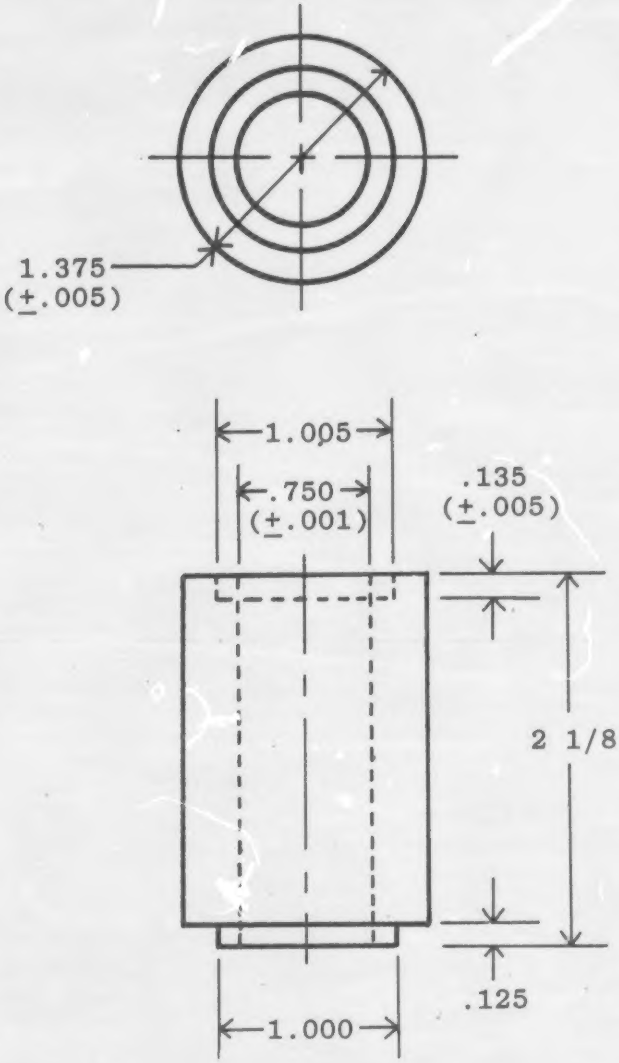
19. Have your work checked by the instructor.
20. Clean up the work area and return the supplies to the storage area.

LATHE WORK

Project Number: III-4D2

Project Title: Planer Jack - Part D2 (Extender)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .002) Ang. (± 1/2°)

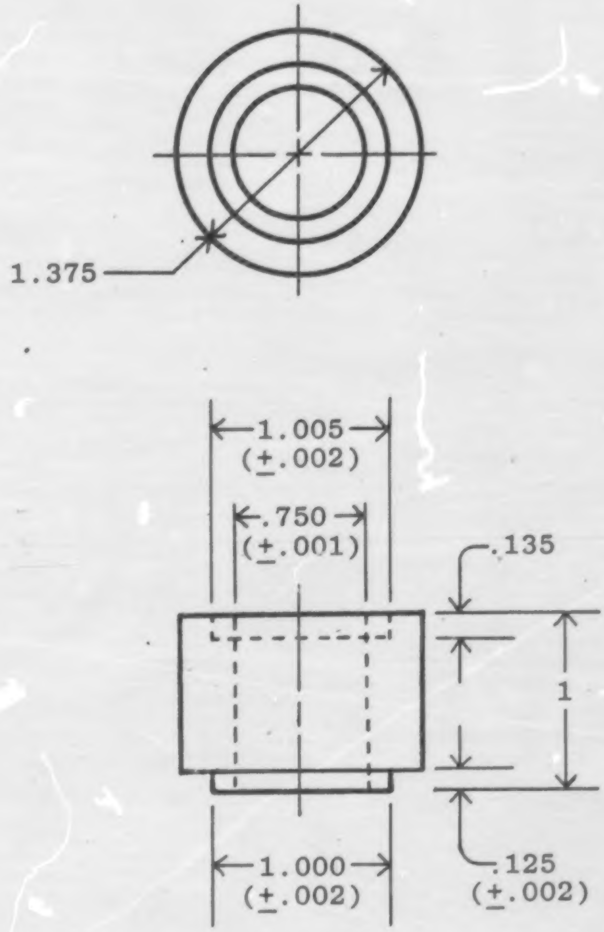

1.375
(±.005)
1.005
.750
(±.001)
.135
(±.005)
2 1/8
.125
1.000

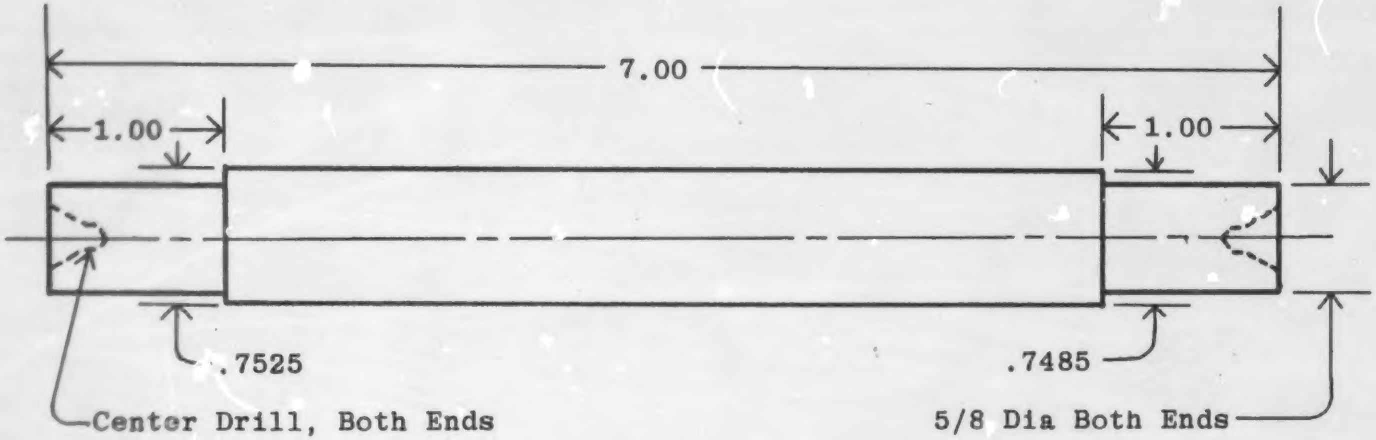
LATHE WORK

Project Number: III-4D3

Project Title: Planer Jack - Part D3 (Extender)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


1.375
1.005
(±.002)
.750
(±.001)
.135
1
1.000
(±.002)
.125
(±.002)


7.00
1.00
1.00
.7525
.7485
Center Drill, Both Ends
5/8 Dia Both Ends

LATHE WORK

Project Number: III-4D1 (Mandrel)

Project Title: Planer Jack - Part D3 (cont.)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± $1/2^{\circ}$)
Notes: Use Tail-Stock Offset Method: T.O. = $\frac{L \times T}{2}$

DUTY: LATHE WORK

TASK: Machine a base for a planer jack.

Performance Objectives:

Given a print for Project III-4E, materials and equipment necessary, the student will machine a base for a planer jack according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

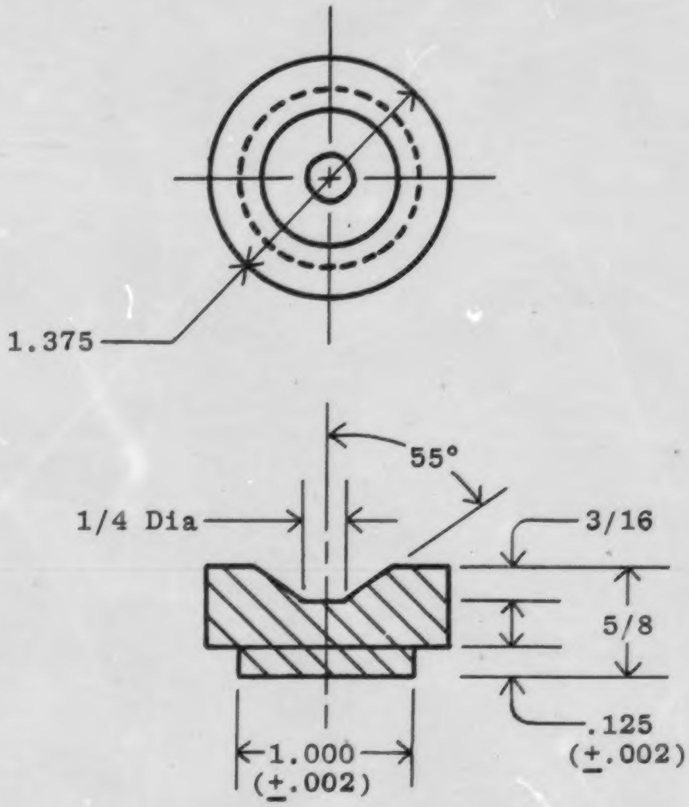
1. Cut off the stock in cutoff saw 1/2" longer so as to hold in a four-jaw chuck.
2. Indicate true and face one end.
3. Turn 1.000 - O.D. step and face shoulder.
4. Reverse the part and chuck in a 1" collet chuck.
5. Face this end to a correct length.
6. Center-drill.
7. Using a 1/4" drill, drill 3/16" deep measuring from the point of drill.
8. Use 1/4" bottoming drill to obtain 1/4" flat.
9. Set compound to 55°. Turn angle.
10. Break all the sharp edges and polish.
11. Have the instructor check your work.
12. Clean up the work area and return the supplies to storage.

LATHE WORK

Project Number: III-4E

Project Title: Planer Jack - Part E (Base)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


1.375
55°
1/4 Dia
3/16
5/8
.125
(±.002)
1.000
(±.002)

DUTY: LATHE WORK

TASK: Machine a mandrel (Part D) for a planer jack.

Performance Objectives:

Given a print for Project III-4D1, materials and equipment necessary, the student will work a mandrel for a planer jack according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

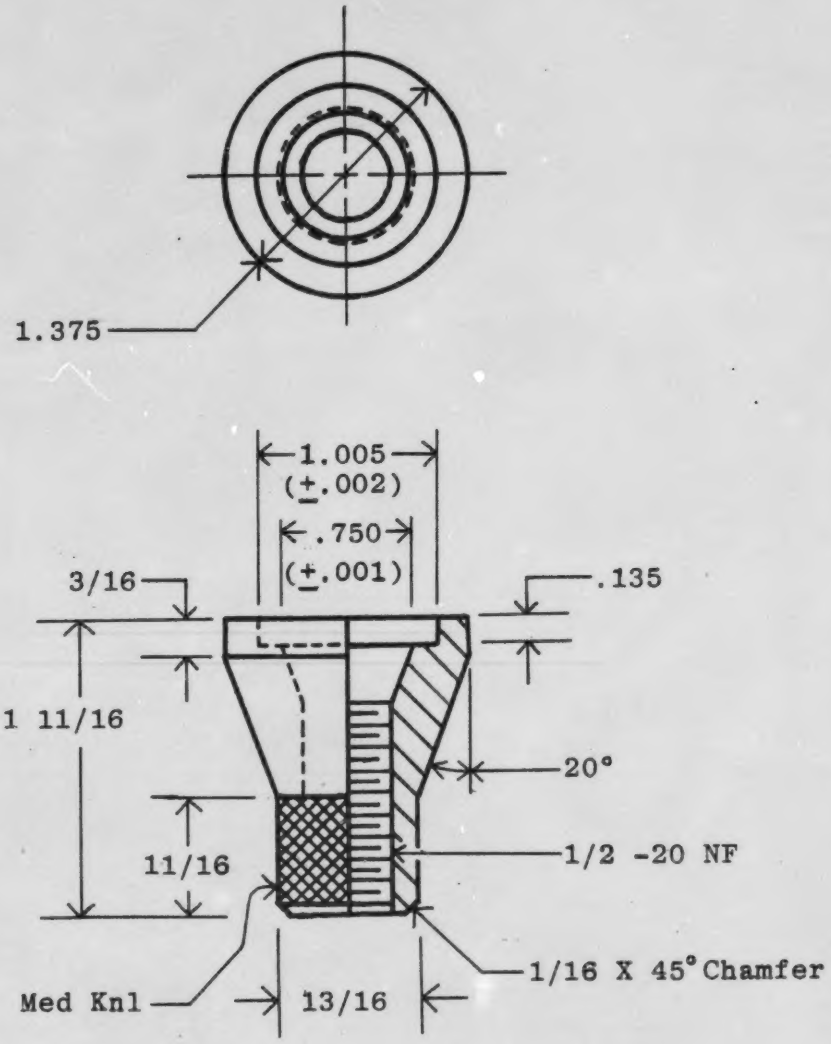
1. Cut off the stock in cutoff saw 1/8" longer than the finished size.
2. Chuck the piece in collet chuck and face one end.
3. Center-drill.
4. Reverse the part and face opposite end to the correct length.
5. Center-drill this end.
6. Place between the centers: Use face plate and lathe dog.
7. Turn one end to 5/8" diameter - 1" in length.
8. Remove the part and reverse to the opposite end.
9. Turn the opposite end to 5/8" diameter - 1" in length.
10. Use the test bar and indicator to precision-align the centers.
11. Use the formula (T.O. = LT ÷ 2) to offset tailstock a correct amount to turn taper on piece.
12. Offset tailstock by use of dial indicator.
13. Place the part between centers and turn taper.
14. Break sharp edges with file.
15. Have the instructor check your work.
16. Clean up the work area and return all the supplies to storage.

LATHE WORK

Project Number: III-4F

Project Title: Planer Jack - Cone (Part F)

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64) Dec. (± .005) Ang. (± 1/2°)


1.375
1.005
(±.002)
.750
(±.001)
3/16
.135
1 11/16
20°
1/2 -20 NF
11/16
1/16 X 45° Chamfer
Med Knl
13/16

DUTY: LATHE WORK

TASK: Machine a spindle-shaft test bar.

Performance Objectives:

Given a print for Project III-5, materials and equipment necessary, the student will work a spindle-shaft test bar according to specifications.

Evaluation Criterion:

The student will complete the project, within a length of time considered reasonable, to the satisfaction of the instructor.

Performance Guide:

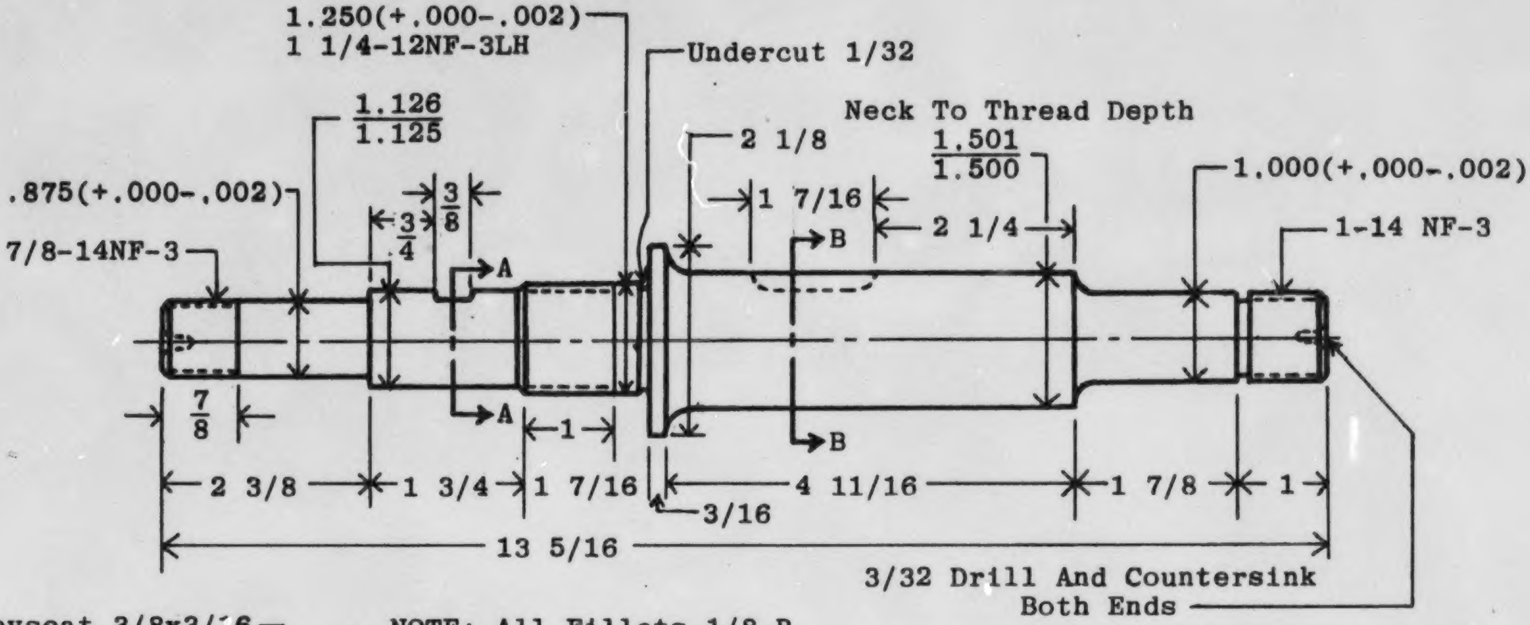
1. Cut off a 2-inch diameter stock 1/8" oversize in length for facing.
2. Face off the ends and center-drill.
3. Mount the stock in six-jaw chuck on 17-inch lathe for rough turning.
4. Turn down all dimensions 1/16" oversize both length and diameter using leavy-cut technique.
5. Remove the work from chuck and insert lathe-center in chuck.
6. Mount the work between the centers with lathe-dog attached.
7. Finish-turn down all diameters .003" to .005" oversize and bring the length to within the tolerances.
8. File and polish all dimensions to within the specified limits. Chamfer the ends as specified.
9. Undercut 1 1/4" diameter and 1/32" deep according to the print.
10. Neck 1 inch diameter to thread depth in position according to the print.
11. Set up machine for turning R.H. threads.
12. Thread the end that is mounted next to the tailstock spindle as specified by print.
13. Complete threading using a proper thread micrometer to check and bring the thread to the correct pitch diameter and size.

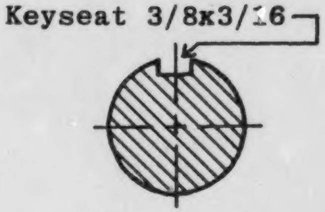
DUTY: LATHE WORK

TASK: Machine a spindle-shaft test bar.

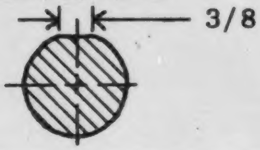
Performance Guide (cont.):

14. Turn the shaft around, mounting unthreaded end toward the tailstock. When remounting the lathe dog over the threaded end, protect threads with soft metal.
15. Thread the end which is now mounted near the tailstock according to the specifications.
16. Complete threading using proper thread micrometer to check and bring thread to a correct pitch diameter and size.
17. Remount the shaft between the centers so that 1 1/4 inch diameter section is closest to the head stock; center if necessary.
18. Set up machine for turning L.H. threads.
19. Cut L.H. threads on 1 1/4 inch diameter as specified by print.
20. Complete threading using three wire system to check and bring thread to a correct size.
21. Break all sharp corners with file.
22. Remove the work from lathe for inspection.
23. Have the instructor check your work.
24. Clean up the work area and return all the supplies to storage.


1.250(+.000-.002)
1 1/4-12NF-3LH
Undercut 1/32
1.126
1.125
Neck To Thread Depth
2 1/8
1.501
1.500
.875(+.000-.002)
3/8
3/4
1 7/16
2 1/4
1.000(+.000-.002)
7/8-14NF-3
B
1-14 NF-3
A
A
B
7/8
1
2 3/8
1 3/4
1 7/16
4 11/16
1 7/8
1
3/16
13 5/16
3/32 Drill And Countersink
Both Ends


Keyseat 3/8x3/16

Section B-B



Section A-A

NOTE: All Fillets 1/8 R
Chamfer Starting End of All Threads 30 to Thread Depth

LATHE WORK

Project Number:	III-5
Project Title:	Spindle Shaft Test Bar
Material:	S.A.E. 3135
Scale:	1"=2"
Tolerance: (unspecified)	Frac. (± 1/64") Dec. (±.005") Ang. (± 1/2)
Requirement:	Complete job within 4 hours.

DUTY: LATHE WORK

TASK: Machine an extender for a planer jack.

Performance Objectives:

Given prints for Project III-4D2 and III-4D3 and the necessary materials and equipment, the student will machine the extender for the planer jack, using the mandrel from Project III-4D1.

Evaluation Criterion:

The student will complete the projects to the satisfaction of the instructor.

Performance Guide:

1. Cut off the stock for both pieces. Allow 1/8" for facing.
2. Place the piece in four-jaw chuck.
3. Indicate the piece true.
4. Face one end.
5. Center-drill.
6. Drill a hole 1/16" undersize through.
7. Bore .750 I.D. through using a boring tool.
8. Counterbore 1.005" I.D. and face the shoulder.
9. Press the part on the mandrel.
10. Hold between centers, part revolving by means of face plate and lathe dog.
11. Turn 1.375" diameter.
12. Face to correct length.
13. Turn 1.000" diameter and face the shoulder.
14. Break all sharp edges with file and polish.

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine two step blocks.

Performance Objectives:

Given a print for each of the Projects IV-1A and IV-1B, materials and equipment necessary, the student will work two step blocks according to specifications.

Evaluation Criterion:

The student will complete the projects to the satisfaction of the instructor.

Performance Guide:

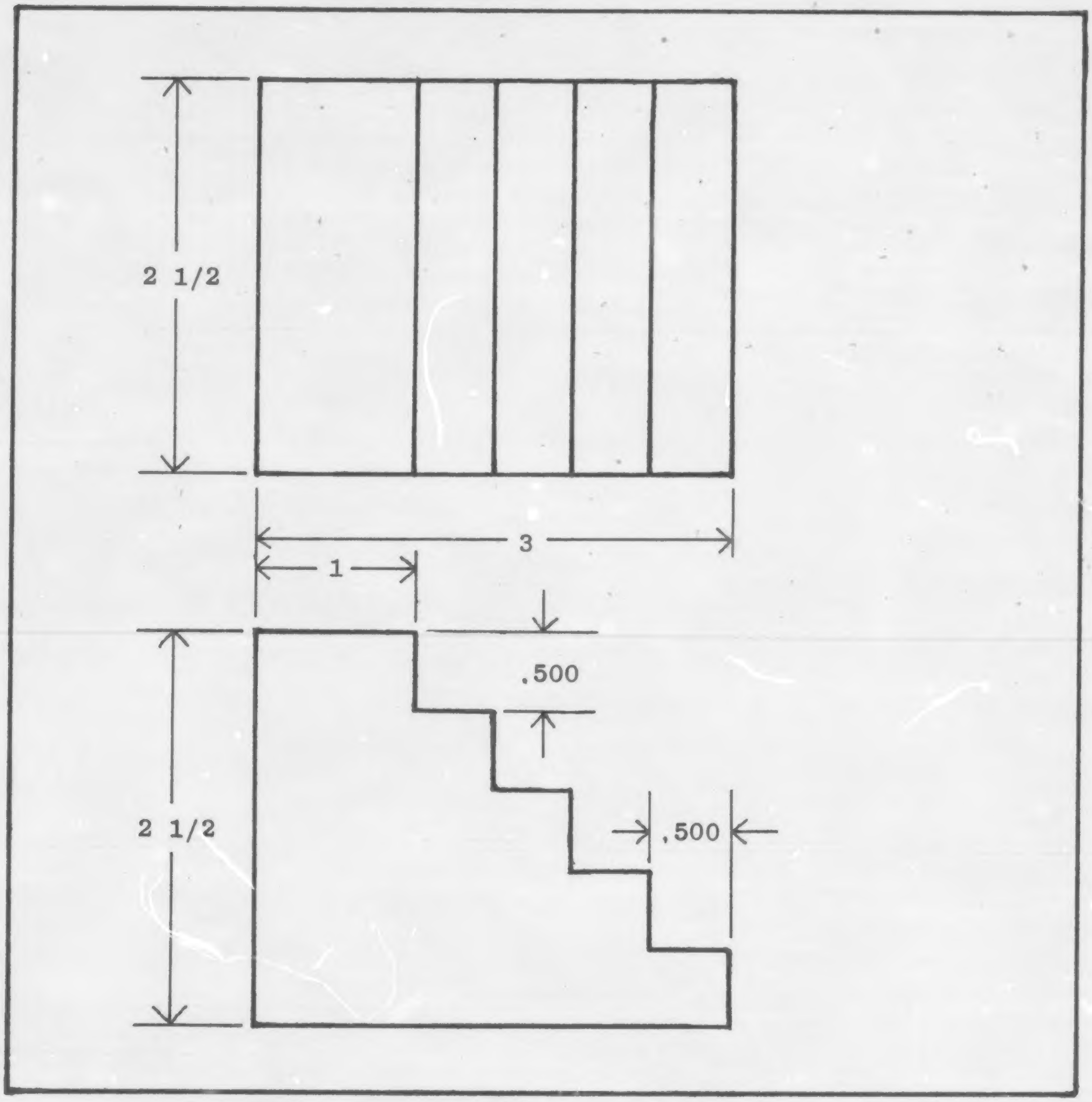
1. Cut off the stock in cutoff saw approximately 1/8" oversize.
2. Mill the part square and parallel.
3. Grind two sides on a surface grinder.
4. Place one finished side on an angle plate using indicator to indicate the top surface.
5. Grind the top surface and one end square on the surface grinder.
6. Remove from the angle plate and surface-grind the opposite sides true.
7. Lay out steps with height gage with the part placed on a surface plate.
8. Cut off excess stock on band saw.
9. Place the part in vise at milling machine and indicate true.
10. Mill the steps to the correct dimensions.
11. Break all sharp edges with file.

MILL WORK

Project Number: IV-1A

Project Title: Step Blocks

Material: C.R.S. (2 1/2" x 2 1/2" x 3")
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)
Requirement: Work 2 pieces

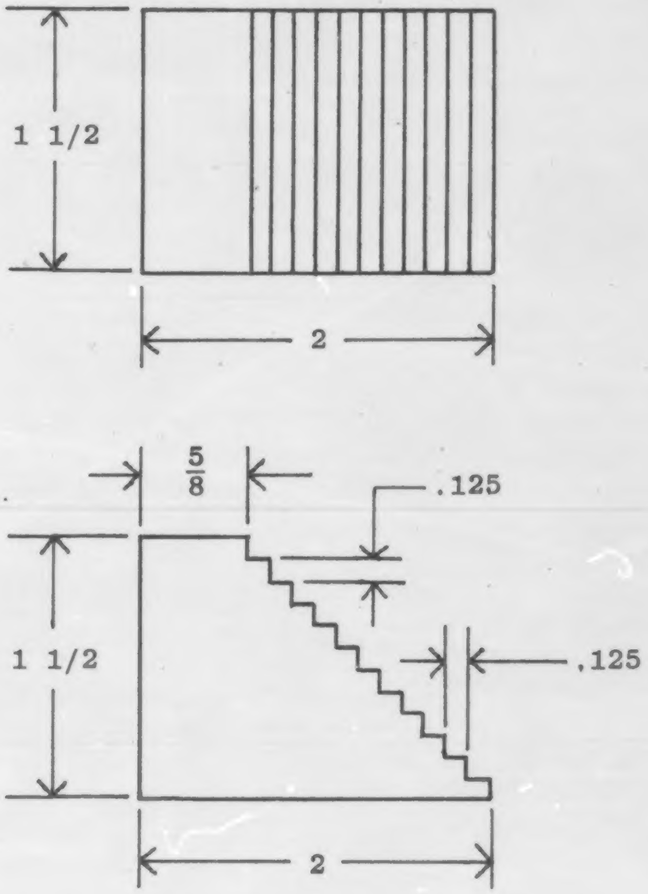


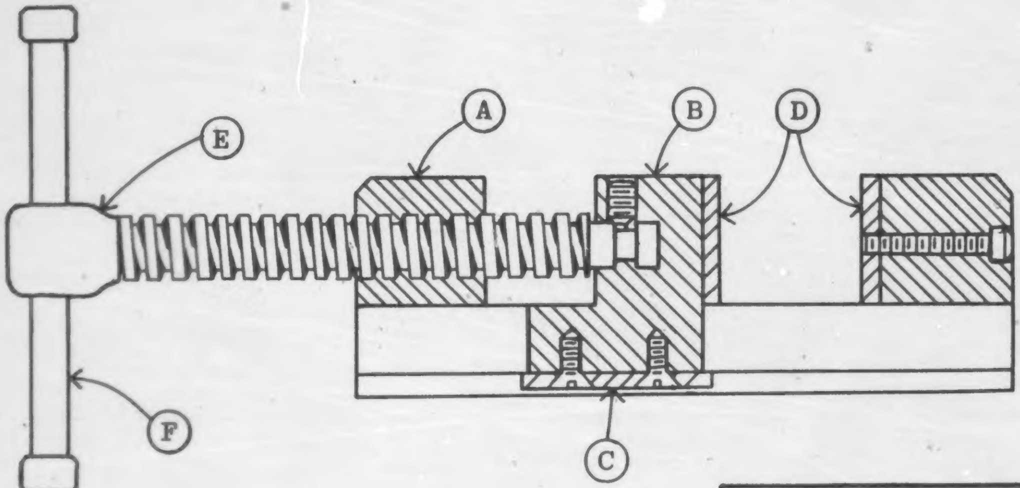
MILL WORK

Project Number: IV-1B

Project Title: Step Block

Material: C.R.S. (2 1/2" square)
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)
Requirement: Work 4 pieces


1 1/2
2
$\frac{5}{8}$
.125
1 1/2
.125
2

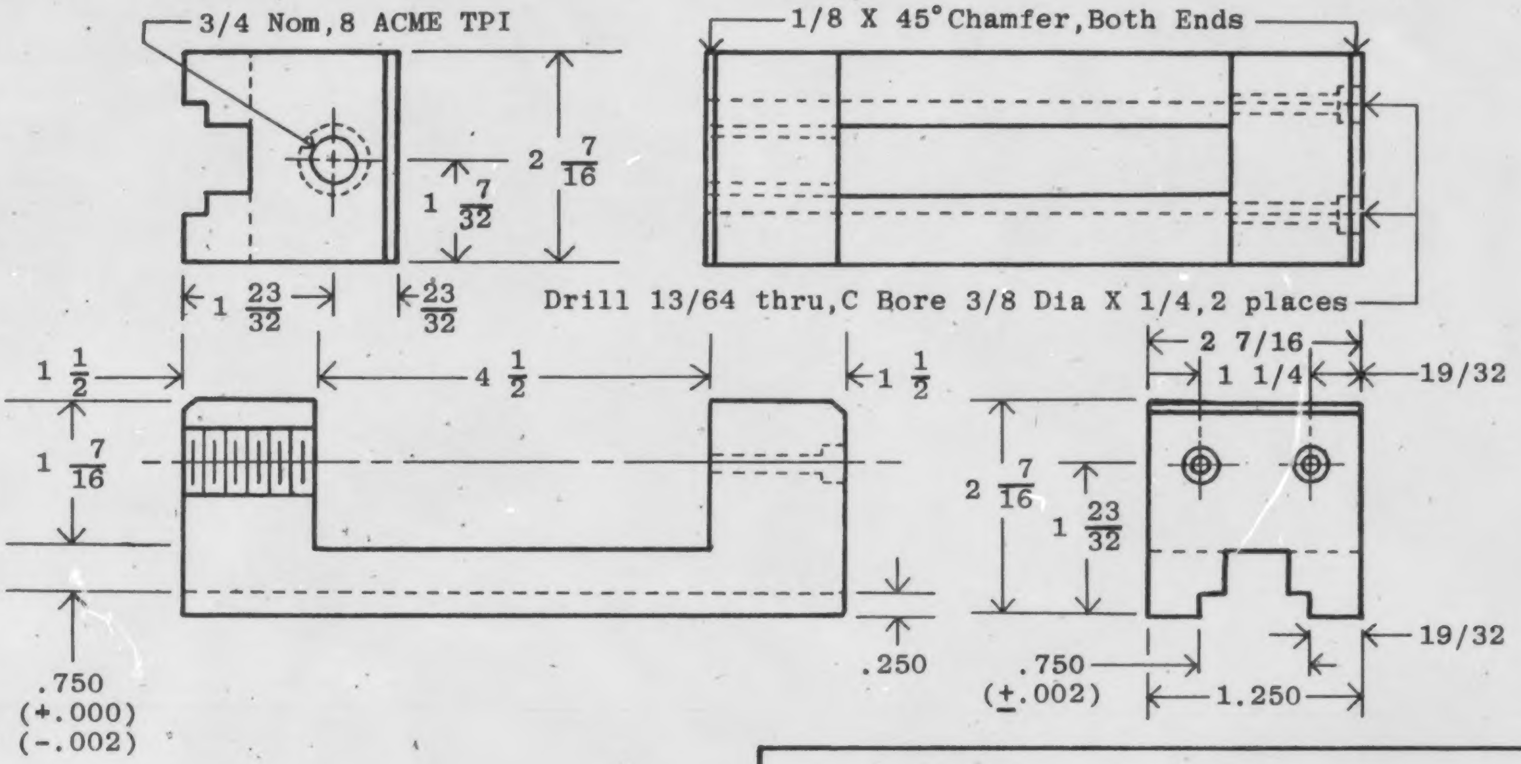


ASSEMBLY OF MACHINISTS VISE

Project Number: IV-2

Project Title: Machinists Vise

Scale: 1/2


3/4 Nom,8 ACME TPI
1/8 X 45° Chamfer,Both Ends
2 7/16
1 7/32
1 23/32
23/32
Drill 13/64 thru,C Bore 3/8 Dia X 1/4,2 places
1 1/2
4 1/2
1 1/2
1 7/16
.750
(+.000)
(-.002)
.250
2 7/16
1 1/4
19/32
2 7/16
1 23/32
19/32
.750
(±.002)
1.250

MILL WORK

Project Number: IV-2A

Project Title: Machinist Vise - Part A

Material: Steel
Scale: 1/2
Tolerance: Frac. (± 1/64")
Radii: Frac. (± 1/8")

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine a body for a machinist vise.

Performance Objectives:

Given a print for Project IV-2A, materials and equipment necessary, the student will work a body for a machinist vise according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Cut off the stock in cutoff saw.
2. Side-mill the ends to the specified length.
3. Slab-mill: Leave oversize.
4. Dress-wheel with diamond dresser and grind square and parallel all surfaces.
5. Lay out the work on surface plate using a height gage.
6. Saw out the cavity using a band saw.
7. Clamp the work in a shaper vise on parallels.
8. Set the shaper stroke to the correct length. Set to a correct speed and feed.
9. Use horizontal cuts.
10. Use vertical cuts.
11. Indicate in head of vertical mill.
12. Mount a vise on mill table.
13. Indicate the vise in using indicator.
14. Use endmill to sidemill. End-mill 4 1/2" opening.
15. Indicate the table of horizontal mill.
16. Mount the vise on table.
17. Indicate the vise on mill indicator.
18. Clamp the work in vise.
19. Mount a side-milling cutter on arbor.
20. Select the correct R.P.M.
21. Select the correct feed.
22. Mill out bottom cavity of the vise. Leave stock for grinding.
23. Dress-wheel using diamond. Side and face.
24. Grind the outside of the part square and parallel, using an angle plate.

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine a body for a machinist vise.

Performance Guide (cont.):

25. Indicate the part parallel on magnetic table. Side-grind and horizontal-grind the bottom to size the cavity of the part.
26. Dress-wheel using a diamond dresser.
27. Indicate the part square on magnetic table.
28. Side-grind and horizontal-grind to size 4 1/2" opening.
29. On a surface plate, use height gage to lay out holes for cap screws and acme threaded hole.
30. Clamp the work in vise on a vertical mill.
31. Using a wiggler point, pick up the layout. Drill and counterbore to size.
32. Using a wiggler point, pick up the layout lines. Drill 3/8" diameter hole through for locating the hole for the acme threads.
33. Mount the part on lathe face plate. Clamp lightly.
34. Indicate 3/8" diameter hole so as to run true.
35. Clamp work securely on face plate.
36. Drill and bore hole to top-drill size.
37. Set up the lathe to cut 29° acme 8 threads per inch.
38. Use the acme screw as a gage and cut threads to the proper fit.
39. Dismount the work and remove the face plate.
40. Have the instructor check your work.
41. Clean up the work area and return all the supplies to the storage area.

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine a movable jaw for a machinist vise.

Performance Objectives:

Given a print for Project IV-2B, materials and equipment necessary, the student will work a movable jaw piece for a machinist vise according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

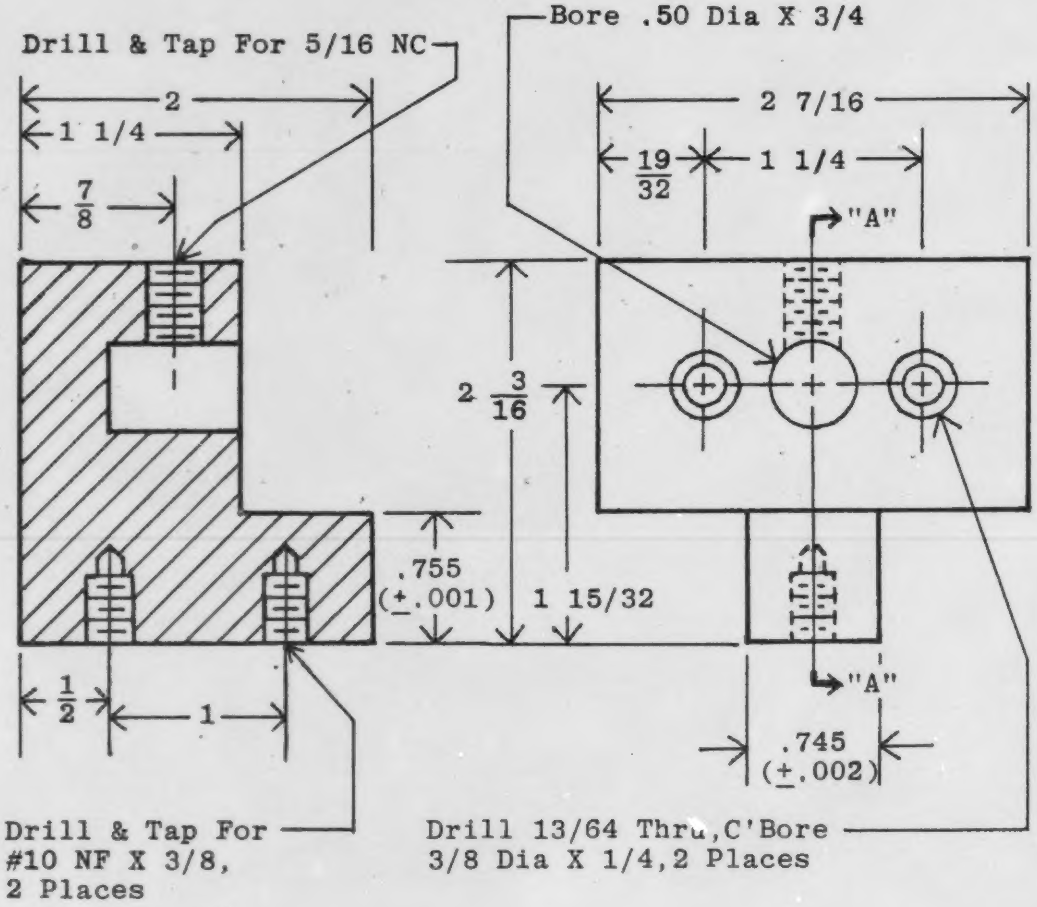
1. Cut off the stock in cutoff saw. Leave 1/8" extra for clean up operation.
2. Mount a slab-mill on the arbor of the horizontal mill.
3. Mount and indicate the vise on table.
4. Machine the work square and parallel. Leave .025" for grinding.
5. Grind the part square and parallel using an angle plate as instructed.
6. Lay out the work on a surface gage using a height gage.
7. Use vertical band saw to remove the excess material.
8. Clamp the work in a vise and use vertical-mill to mill the part. Leave oversize .010 for grinding to size.
9. Indicate and square the work on a surface grinder's magnetic table and grind the vise jaw to size using a flat-grinding and side-grinding.
10. Using a height gage, lay out two holes for holding hardened vise jaw insert.
11. Lay out holes at the bottom of the part for slide.
12. Center-punch; drill counterbore and top as specified on the print.
13. Have the instructor check your work.
14. Clean up the work area and return all the supply to the storage area.

MILL WORK

Project Number: IV-2B

Project Title: Machinist Vise - Part B

Material: Steel
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)


Drill & Tap For 5/16 NC
2
1 1/4
7/8
1/2
1
Drill & Tap For #10 NF X 3/8, 2 Places
Bore .50 Dia X 3/4
2 7/16
19/32
1 1/4
"A"
2 3/16
.755 (±.001)
1 15/32
"A"
.745 (±.002)
Drill 13/64 Thru, C'Bore 3/8 Dia X 1/4, 2 Places

SECTION "A-A"

DUTY: MILLING AND GRINDING WORK

TASK: Machine a plate (slide) for a machinist vise.

Performance Objectives:

Given a print for Project IV-2C, materials, and equipment necessary, the student will work a slide (a plate) for a machinist vise according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

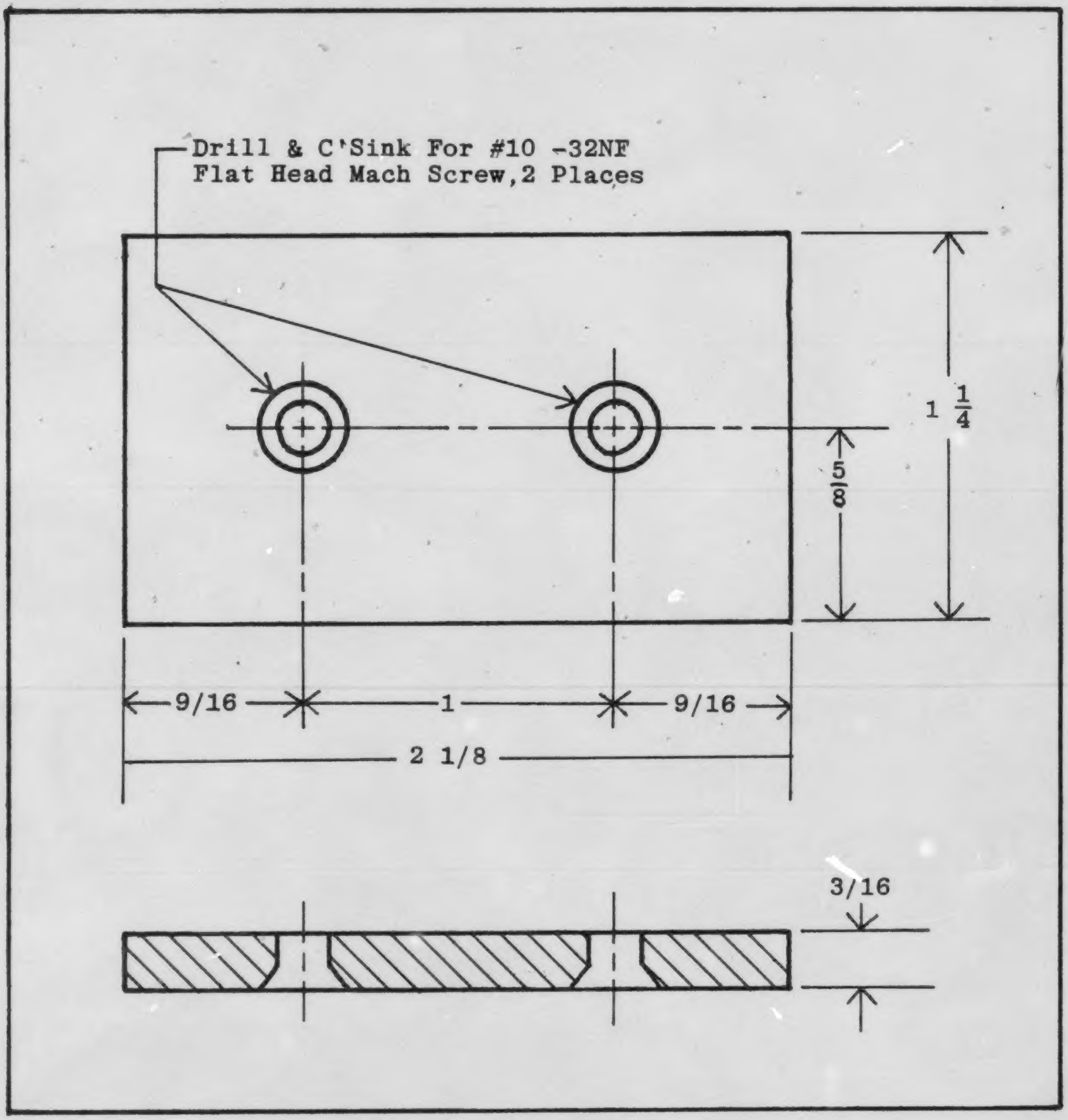
1. Cut off the material oversize in cutoff saw.
2. Mill the part square and parallel. Leave grinding stock.
3. Grind the part to size on a surface grinder making sure that this part is slip-fit in Part A (vise-body).
4. Center-punch the hole location.
5. Using a drill press, drill holes 13/64" diameter body clearance for 10 - 32 N.F. flat-head screw.
6. Countersink one side for flat-head screws.
7. Have the instructor check your work.
8. Clean up the work area and return all the supplies to the storage area.

MILL WORK:

Project Number: IV-2C

Project Title: Machinist Vise - Part C

Material: Steel
Scale: 2" = 1"
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)



Drill & C'Sink For #10 -32NF
Flat Head Mach Screw,2 Places
1 1/4
5/8
9/16
1
9/16
2 1/8
3/16

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine a jaw face for a machinist vise.

Performance Objectives:

Given a print for Project IV-2D, materials and equipment, the student will work a jaw face for a machinist vise according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

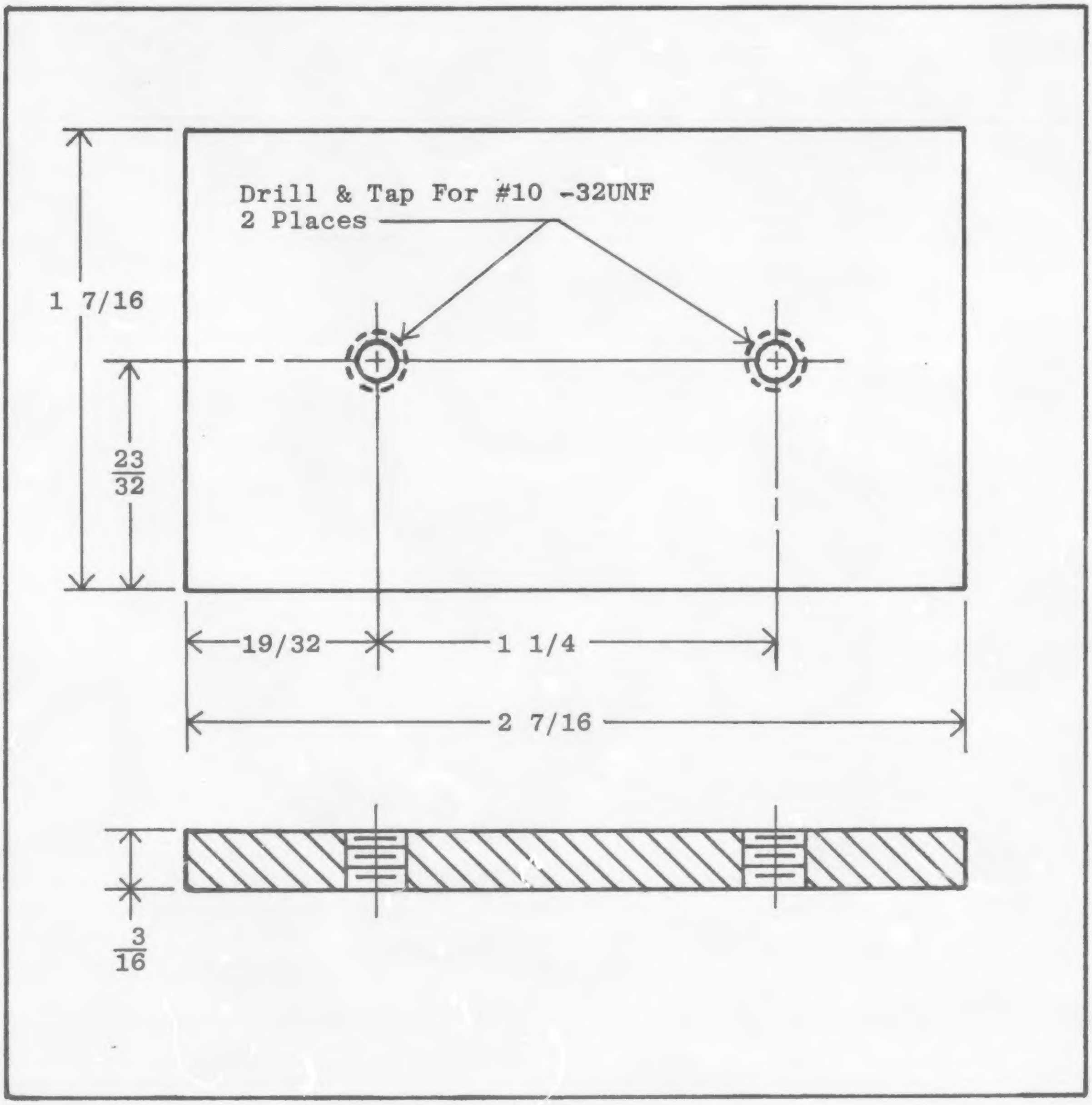
1. Cut off the stock in cutoff saw. Leave oversize.
2. Using a vertical mill, machine the part to size. Leave the material for surface grinding.
3. Grind the part to size on the surface grinder.
4. Lay out for two 10/32" holes on the surface plate using a height gage.
5. Center-punch the hole locations.
6. Using a drill press, drill two holes with No. 21 drill.
7. Chamfer the holes.
8. Tap the holes with 10/32" tap.
9. Harden and temper.
10. Surface-grind the part flat.
11. Assemble the parts after all the pieces are complete.
12. Have the instructor check your work.
13. Clean up the work area and return all the supplies to the storage area.

MILL WORK

Project Number: IV-2D

Project Title: Machinist Vise - Part D

Material: Tool Steel
Scale: 2" = 1"
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)
Requirement: Work 2 pieces.


Drill & Tap For #10 -32UNF
2 Places
1 7/16
23/32
19/32
1 1/4
2 7/16
3/16

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine a vise screw for a machinist vise.

Performance Objectives:

Given a print for Project IV-2E, materials and equipment necessary, the student will work a vise screw for a machinist vise according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

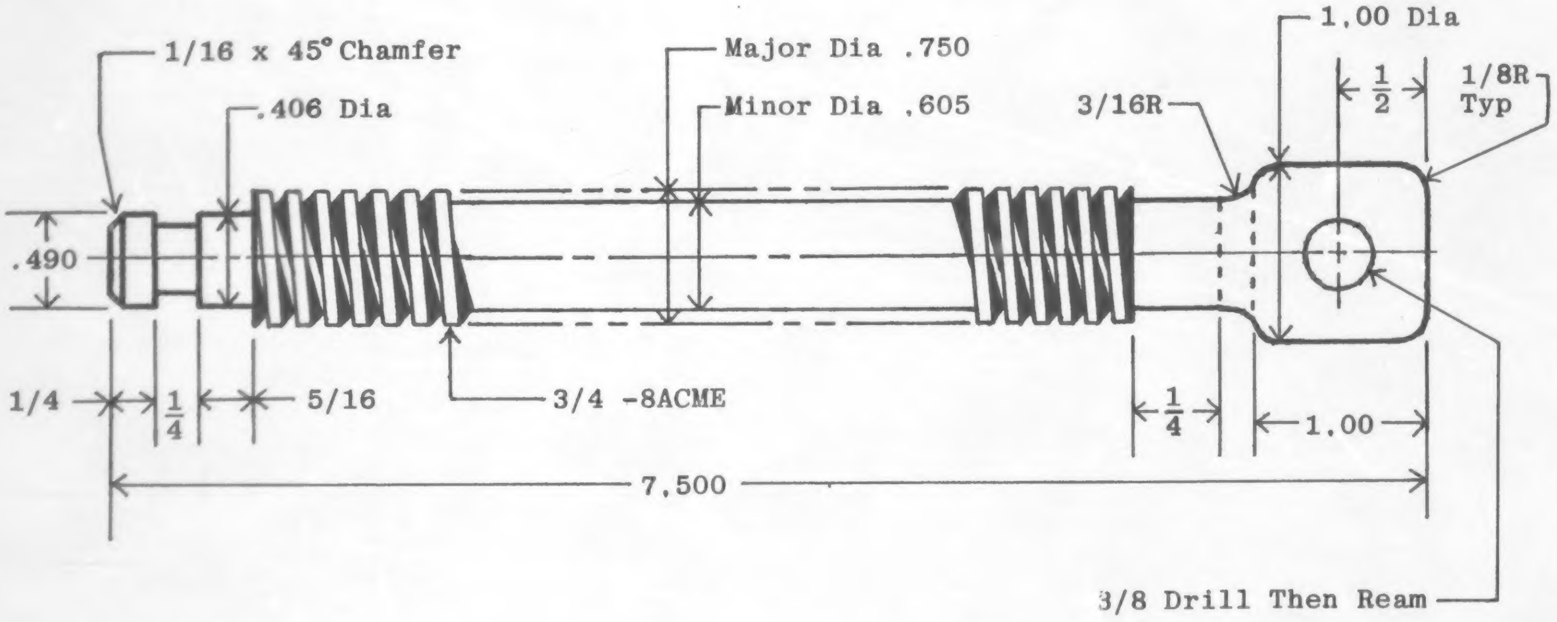
1. Cut off a 1" diameter stock in cutoff saw. Leave oversize for facing.
2. Face off one end to the required length in three-jaw chuck or collet.
3. Lay out the length of the screw and face to the correct length in three-jaw chuck or collet.
4. Center-drill the centers in both ends.
5. Mount the dog on one end of the part.
6. Mount the work between the centers.
7. Calculate the correct R.P.M. and feed for the lathe.
8. Turn 3" diameter down to size.
9. Cut thread relief on both ends of the part to .605 diameter which is a minor diameter of No. 8 acme thread.
10. Set lathe and tool properly to cut No. 8 acme thread.
11. Cut thread until the tool comes in contact with minor diameter.
12. Chamfer to 1/64" x 45° crest of the threads.
13. Turn small end to .490" diameter and undercut for set screw.
14. Using a form tool, machine radius both inside and outside.
15. Lay out the hole for the screw handle.
16. Set up the work in a vertical mill vise.
17. Select the correct R.P.M.
18. Using a ball edge finder or indicator, locate a spindle over the center of screw.
19. Center-drill. Drill and ream the hole.

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine a vise screw for a machinist vise.

Performance Guide (cont.):

20. Have the instructor check your work.
21. Clean up the work area and return the supplies to the storage area.


1/16 x 45° Chamfer
.406 Dia
Major Dia .750
Minor Dia .605
3/16R
1.00 Dia
1/2
1/8R Typ
.490
1/4
1/4
5/16
3/4 -8ACME
1/4
1.00
7.500
3/8 Drill Then Ream

MILL WORK

Project Number: IV-2E

Project Title: Machinist Vise - Part E

Material: Steel
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)

DUTY: MILLING MACHINE AND GRINDING WORK

TASK: Machine a vise handle for [illegible] machinist vise.

Performance Objectives:

Given a print for Project IV-2F, the student will work a handle for a machinist vise according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

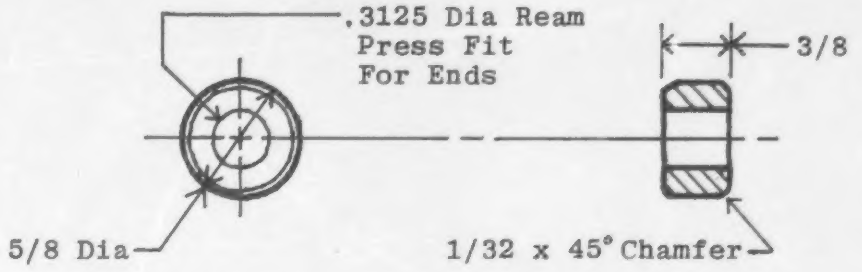
1. Cut off a 3/8" diameter stock in cutoff saw. Leave 1/8" for facing.
2. Hold the work in lathe collet.
3. Select a correct R.P.M.
4. Face-off one end.
5. Lay out the length.
6. Face the other end to a correct length.
7. Turn both ends to a correct diameter for press-fit.
8. Drill and ream the end caps for press-fit on the end of the handle.
9. Press on one end cap.
10. Insert the handle in the screw and press the end cap on the opposite end.
11. Have the instructor check your work.
12. Clean up the work area and return the supplies to the storage area.

MILL WORK

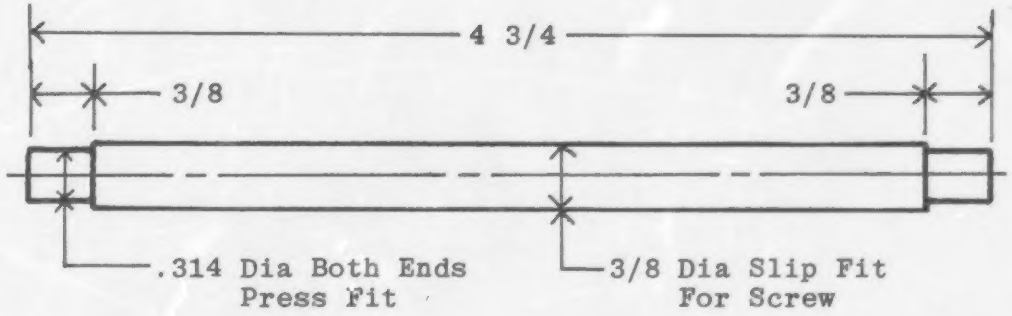
Project Number: IV-2F

Project Title: Machinist Vise - Part F

Material: Steel
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)
Requirement: Work 1 handle and 2 end pieces.


.3125 Dia Ream
Press Fit
For Ends
3/8
5/8 Dia
1/32 x 45° Chamfer

ENDS


4 3/4
3/8
3/8
.314 Dia Both Ends
Press Fit
3/8 Dia Slip Fit
For Screw

HANDLE

DUTY: MILLING AND PRECISION GRINDING WORK

TASK: Machine an edge finder.

Performance Objectives:

Given a print for Project V-1, materials and equipment necessary, the student will work an edge finder according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Cut off the tool steel to a required length in band saw.
2. Set up the vertical mill for milling.
3. Mill the piece square and parallel: Leave 1/32" oversize.
4. Clean and oil the grinder.
5. Mount a 46 grit aluminum oxide wheel on the surface grinder.
6. True and dress the grinding wheel.
7. Set the work on the magnetic chuck.
8. Grind the flat surface within .0001.
9. Square the work off on an angle plate.
10. Lay out the work according to the print.
11. Locate and drill three holes in a drill press.
12. Using vertical band, set up the work in vertical mill leaving .010 material on milled surface for grinding.
13. Harden and temper the edge finder in heat-treatment.
14. True and dress the grinding wheel.
15. Grind the two surfaces flat within .0001.
16. Grind all sides square and to size using an angle plate.
17. Using gage blocks, .0001 indicator, and height gage on the angle plate, grind 75° dimension to size.
18. Clamp and indicate the work on angle plate.
19. Dress and true wheel.
20. Grind flat .403 dimension.
21. Vertical grind with side of wheel .876 dimension.
22. Check .312 dimension with gage blocks and .0001 indicator.
23. If not correct, repeat the steps 19, 20, 21, and 22.

DUTY: MILLING AND PRECISION GRINDING WORK

TASK: Machine an edge finder.

Performance Guide (cont.):

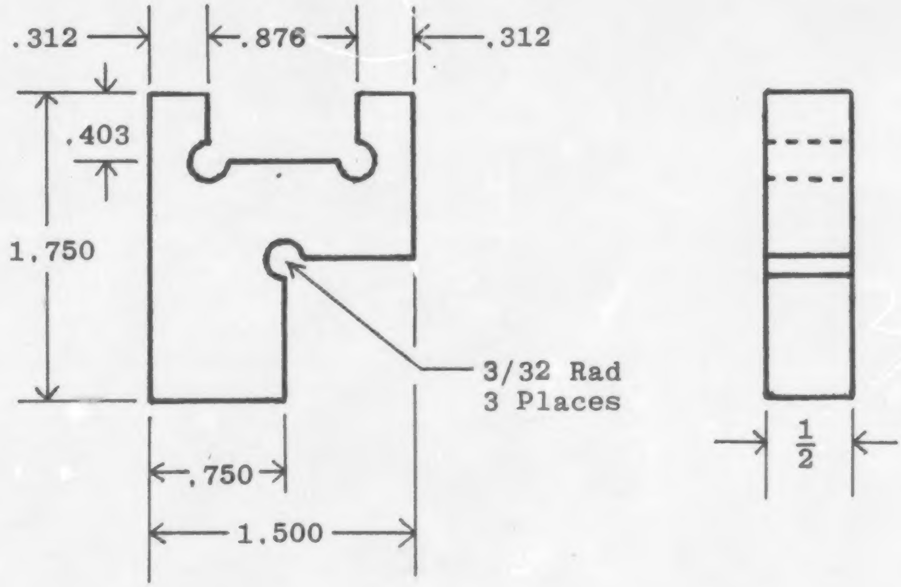
24. Have the instructor check your work.
25. Clean up the work area and return the supplies to the storage area.

MILLING AND PRECISION GRINDING

Project Number: V-1

Project Title: Edge Finder

Material: Tool Steel
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .0001")


.312
.876
.312
.403
1.750
3/32 Rad
3 Places
.750
1.500
1/2

DUTY: MILLING AND PRECISION GRINDING WORK

TASK: Machine a V-block.

Performance Objectives:

Given a print for Project V-2A, materials, and equipment necessary, the student will machine a V-block.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Cut off the stock in cutoff saw 1/8" oversize to allow for squaring.
2. Mill the ends square, or face square in lathe, leaving .040" for grinding.
3. Fasten the piece to the angle plate; indicate parallel and grind all the surfaces true. Leave .010" on side for grinding after heat treatment.
4. Lay out the piece using the center of the piece as reference to scribe lines.
5. Indicate the vise of milling machine parallel.
6. Swivel the head of vertical mill 45°.
7. Mill 90° V's in the block with end mill.
8. Swivel the head perpendicular and mill 3/32" grinding relief on both V's.
9. Turn the part endwise; clamp again in the vise.
10. Pick up the edges of the piece with a ball wiggler.
11. Move the table and saddle so that the spindle is on the exact center of the piece.
12. Center-drill.
13. Drill with No. 7 drill deep enough to allow for the depth at the top.
14. Tap 1/4" - 20 x 3/4" deep.
15. Place the part in vise on its side to mill the slots.
16. Mill the slots for yoke 11/32" x 7/2".
17. Take the part to heat-treat and air harden.
18. After hardening, finish-grind all the surfaces to the tolerance.
19. Place the V-block on sine plate. Set 45° angle using

DUTY: MILLING AND PRECISION GRINDING WORK

TASK: Machine a V-block.

Performance Guide (cont.):

the correct gage blocks to obtain the correct height for the angle. V-block must be placed against the back edge of sine plate in order to grind correctly.

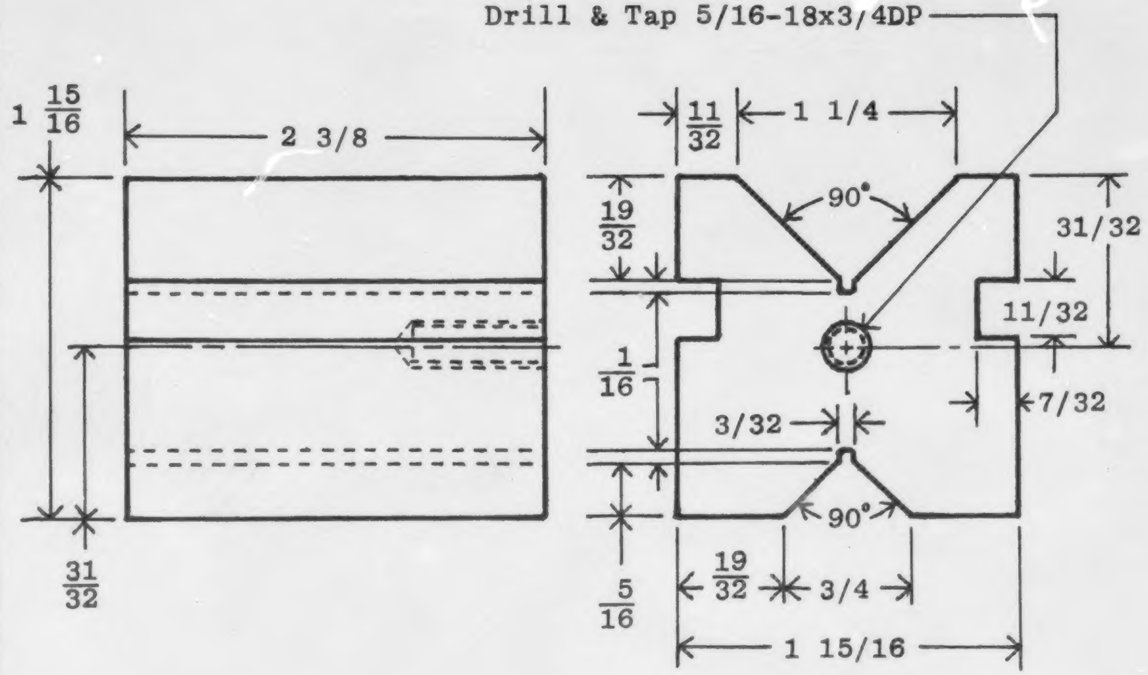
20. Indicate the V-block true on the surface grinder magnet.
21. Grind the large 90° angle.
22. Turn the piece to surface opposite side and grind angle.
23. Check on the surface plate for squareness.
24. Break all the sharp edges.
25. Have the instructor check your work.
26. Clean up the work area and return all the supplies to the storage area.

MILLING AND PRECISION GRINDING

Project Number: V-2A

Project Title: V Block

Material: Tool Steel
Scale: Full
Tolerance: Frac (± 1/64") Dec. (± .005") Ang. (± 1/2°)
Squareness: ± .0002
Parallel: ± .0002


Drill & Tap 5/16-18x3/4DP
1 15/16
2 3/8
31/32
11/32
1 1/4
90°
19/32
31/32
11/32
1/16
7/32
3/32
90°
5/16
19/32
3/4
1 15/16

DUTY: MILLING AND PRECISION GRINDING WORK

TASK: Machine a V-block yoke.

Performance Objectives:

Given a print for Project V-2B, materials, and equipment necessary, the student will machine a V-block yoke according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Cut off 5/8" x 3" C.R.S. (cold rolled steel) in cut-off saw. Allow 1/8" for squaring.
2. Mill the length and width to dimensions on the print.
3. Lay out the yoke according to the drawing, using a height gage and necessary tools.
4. Locate 1/2" diameter construction hole in vertical mill. Drill and ream.
5. Mount and locate the rotary table on the milling machine.
6. Locate and clamp the yoke on rotary table: Mill the outside radius to size.
7. Clamp the yoke in the milling machine vise and locate 1/2" hole: Drill and bore to 2" diameter.
8. Using 1/2" end mill, mill out the inside of the yoke to the dimensions.
9. Saw out the web at the bottom of the yoke.
10. Clamp the work in vertical mill vise; side mill to size (1.500 diameter).
11. Hold the yoke in proper position: Use T-slot cutter; mill out 1/4" radius from the corners.
12. Clamp the work in the vise: Locate, drill and tap for 5/16-18 NC thread.
13. Mount the boring head in mill and turn 5/8" diameter to size.
14. Finish-grind all the surfaces on the surface grinder.
15. Break all sharp edges with file.

DUTY: MILLING AND PRECISION GRINDING WORK

TASK: Machine a V-block yoke.

Performance Guide (cont.):

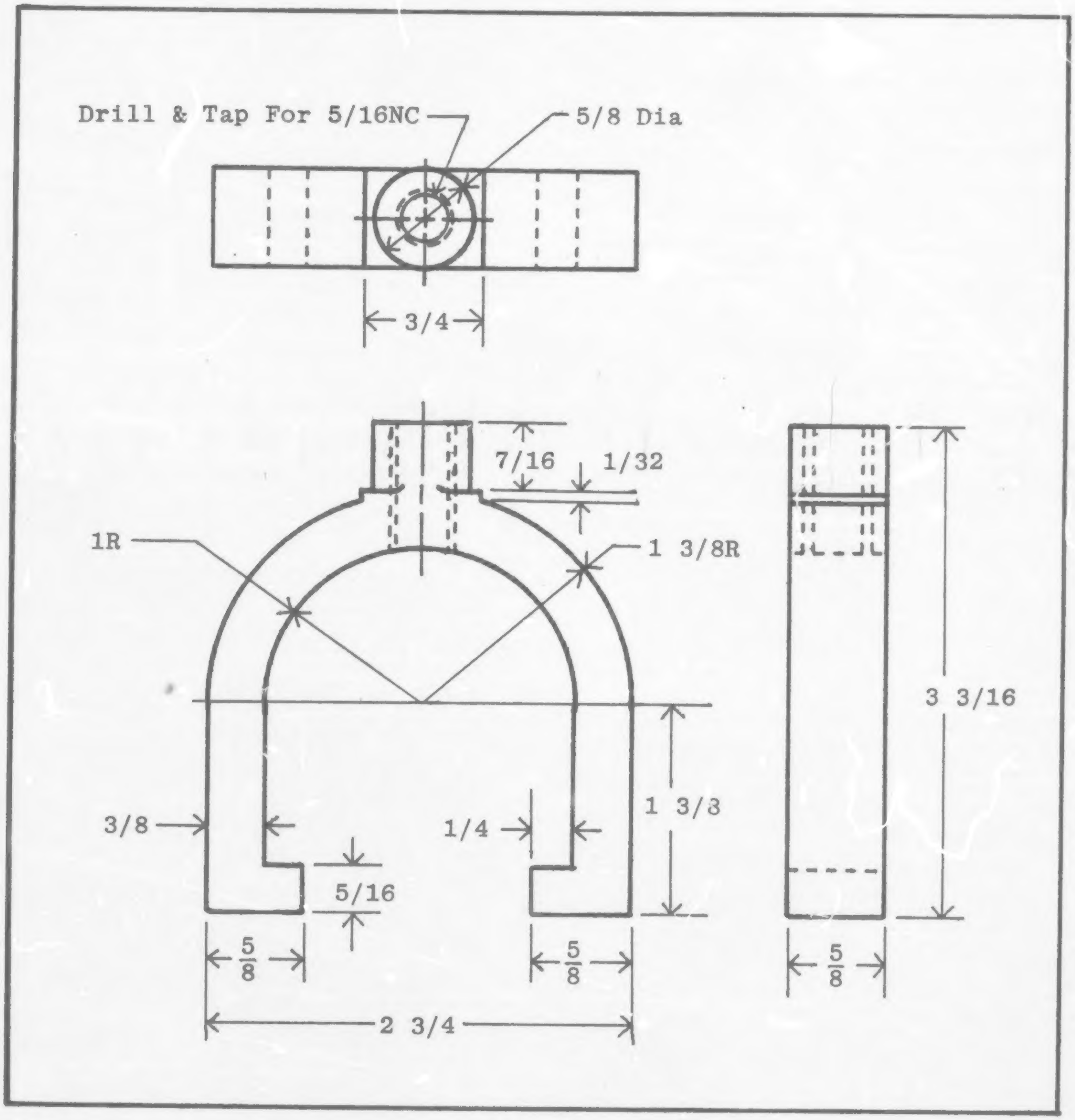
16. Have the instructor check your work.
17. Clean up the work area and return supplies to the storage area.

MILLING AND PRECISION GRINDING

Project Number: V-2B

Project Title: V Block Yolk

Material: C.R.S.
Scale: Full
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)



Drill & Tap For 5/16NC
5/8 Dia
3/4
7/16
1/32
1R
1 3/8R
3/8
1/4
1 3/8
5/16
5/8
5/8
2 3/4
3 3/16
5/8

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DUTY: MILLING AND PRECISION GRINDING WORK

TASK: Machine 1-2-3 blocks.

Performance Objectives:

Given a print for Project V-3, materials and equipment necessary, the student will machine 1-2-3 blocks, according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

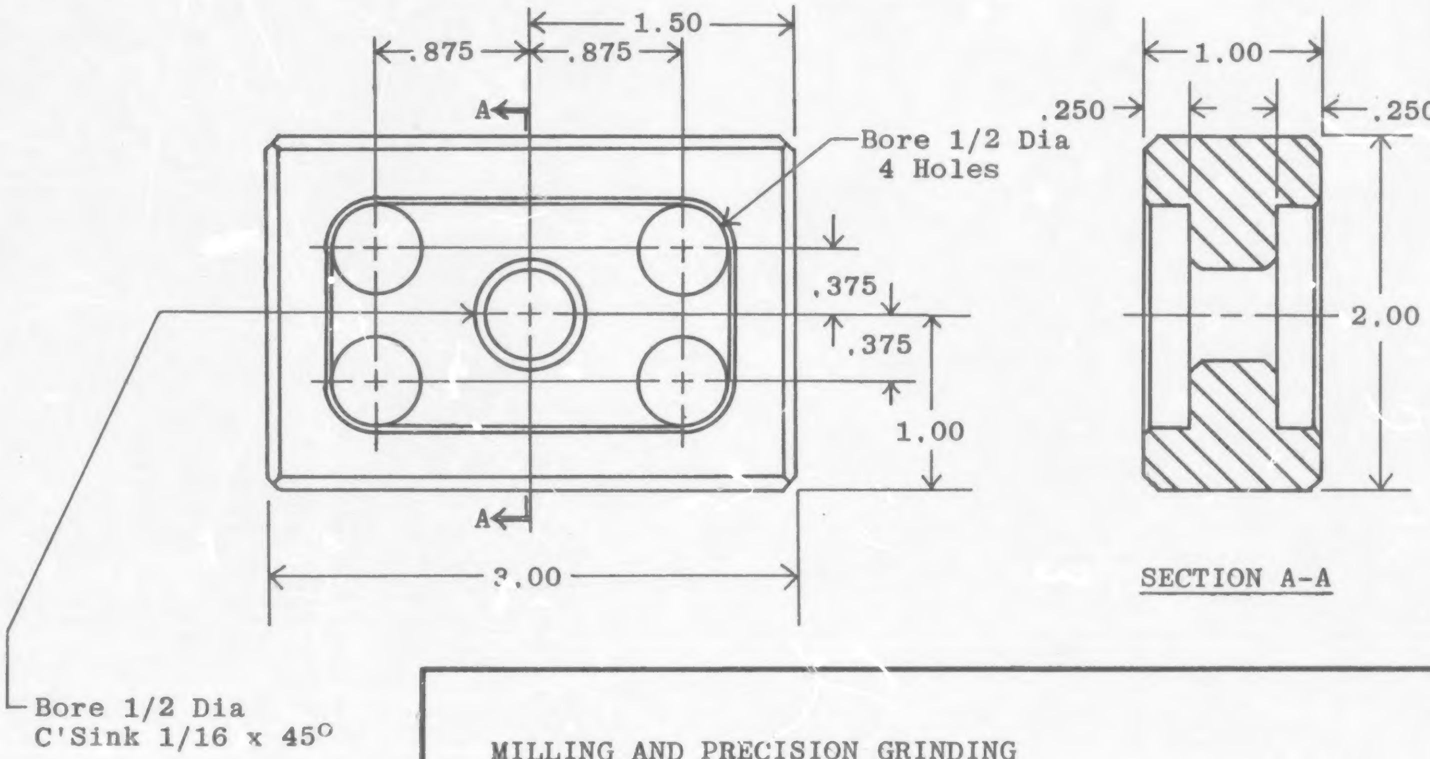
Performance Guide:

1. Saw off 5" of 3" x 3" A-4 tool steel in cutoff saw.
2. Grind the piece parallel and square: Leave .020" over 3" dimension.
3. Using a cutoff saw, cut off the excess stock from 3" dimension: Leave 1/16" over 2" dimension for milling.
4. Using a vertical mill, mill off the saw-cut: Leave .030" over 2" dimension.
5. Grind 2" dimension: Leave .020" oversize.
6. Using a height gage, lay out four 1" dimension on the piece. Allow 3/16" between each 1" piece for the saw-cuts.
7. Using a vertical mill, mill 1" dimensions leaving .030" oversize on all pieces.
8. Grind in 1" dimension leaving .020" oversize.
9. Lay out the part according to the print, using a height gage.
10. Using a vertical mill, locate, drill and ream all 1/2" diameter holes.
11. Rough-mill the inside cavity, leaving .030" for the finish-cut.
12. Finish-mill all the inside cavities, using digital readouts for the correct measurement.
13. Harden and temper to R-C 58. Grind two sides parallel on all pieces.
14. Using an angle plate, grind square the 2" size and the 3" size.
15. Using a height gage, dial-indicator and gage blocks, grind-in 2.0000", 3.0000" dimensions ± .0002.
16. Grind 45°: Chamfer on all sides and ends using a

Performance Guide (cont.):

sine table.

17. Have the instructor check your work.
18. Clean up the work area and return all the supplies to the storage area.


1.50
.875
.875
A
Bore 1/2 Dia
4 Holes
.375
.375
1.00
3.00
A
1.00
.250
.250
2.00
SECTION A-A
Bore 1/2 Dia
C'Sink 1/16 x 45°

MILLING AND PRECISION GRINDING

Project Number: V-3

Project Title: 1-2-3 Gauge Blocks

Material: Tool Steel
Scale: Full
Requirement: 1. All Exterior CFR 1/16" x 45°
2. All Interior CFR 1/32" x 45°
3. All Exterior Surfaces Ground to ±.0002
4. Harden to R.C. 59-61

DUTY: MILLING AND PRECISION GRINDING

TASK: Machine an angle plate.

Performance Objectives:

Given a print for Project V-4, materials, and equipment necessary, the student will machine an angle plate according to specifications.

Evaluation Criterion:

The student will complete the project to the satisfaction of the instructor.

Performance Guide:

1. Saw off one 3" x 3" x 5" piece of A-4 tool steel in cutoff saw.
2. Face off both ends in lathe (holding in four-jaw-chuck). Leave 1/32" oversize for grinding.
3. Grind two sides parallel and square the adjacent side using an angle plate as a guide.
4. Lay out to the print allowing .020 for hardening.
5. Using a drill press, locate and drill three 3/16" relief holes.
6. Using a horizontal cutoff saw and vertical band saw, cut away the excess stock from the angle plate being machined. Allow 1/16" for milling.
7. Mill all surfaces in vertical mill. Leave .020 for hardening.
8. Using a height gage, lay out locations for all the tapped holes.
9. Using a radial drill press, locate, drill and tap each hole.
10. Harden and temper to R-C 58.
11. Clamp the work to the guide angle plate and indicate the top surface parallel.
12. Grind the surface flat within .0002.
13. Clamp the finish-ground surface to angle plate.
14. Grind square to adjacent side within .0002.
15. Grind off one end of the angle plate being machined.
16. Remove the work from the guide angle plate. Grind-in all unfinished surfaces square and parallel within .0002.

Performance Guide (cont.):

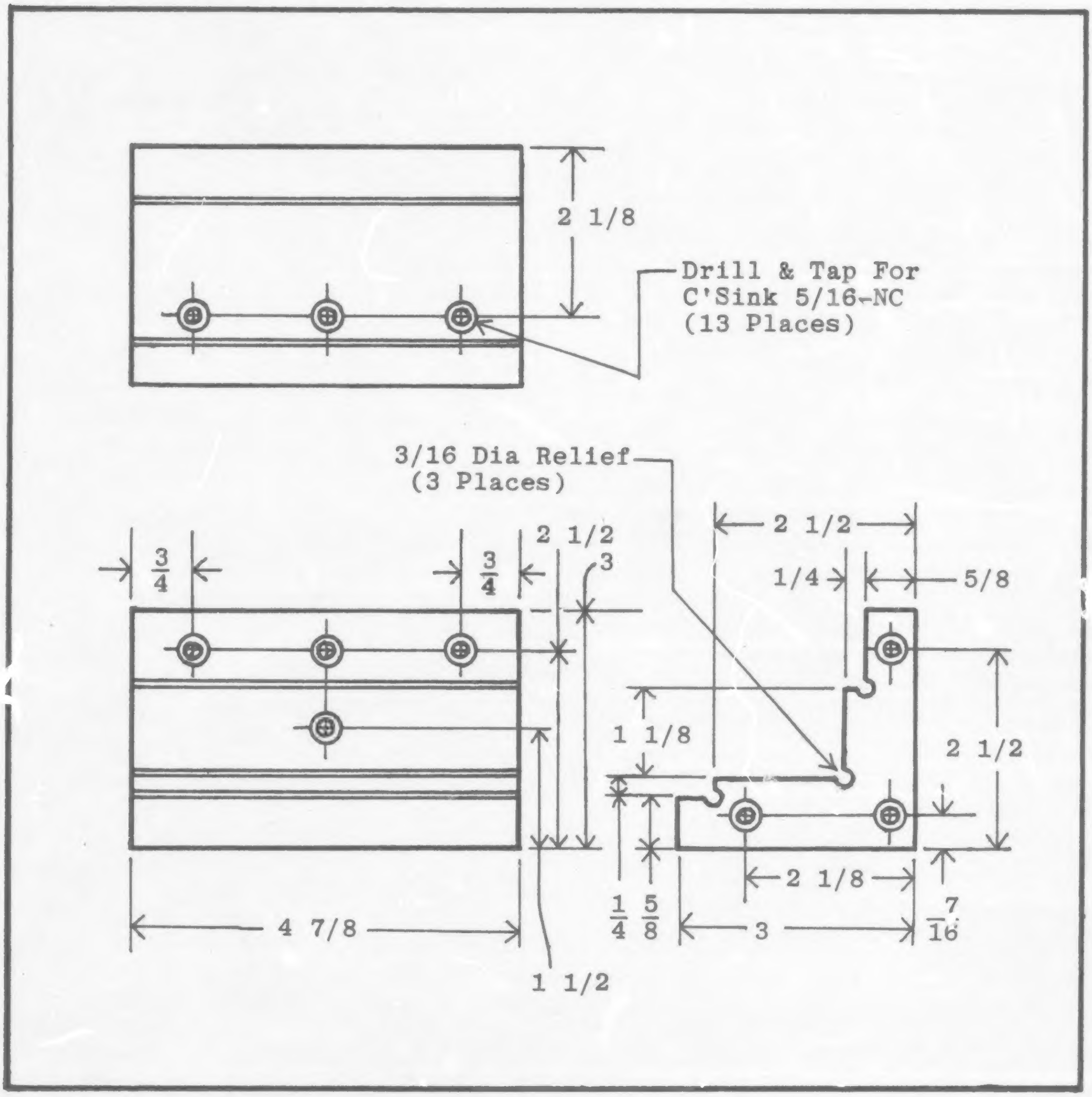
17. Have the instructor check your work.
18. Clean up the work area and return all the supplies to the storage area.

MILLING AND PRECISION GRINDING

Project Number: V-4

Project Title: Angle Plate

Material: Tool Steel
Scale: 1"=2"
Tolerance: Frac. (± 1/64") Dec. (± .005") Ang. (± 1/2°)
Squareness: ± .0002 in 3.000
Parallel: ± .0002 in 5.000



2 1/8
Drill & Tap For C'Sink 5/16-NC (13 Places)
3/16 Dia Relief (3 Places)
3/4
3/4
2 1/2
3
2 1/2
1/4
5/8
1 1/8
2 1/2
2 1/8
4 7/8
1/4
5/8
3
7/16
1 1/2

Introduction and Outline:

English
Spanish
Laotian

EC 024 8/21

INTRODUCTION to MACHINE TRADES

CAREER DEVELOPMENT CENTER
SCHOOL OF TECHNICAL CAREERS
SOUTHERN ILLINOIS UNIVERSITY
CARBONDALE, ILLINOIS

COMPETENCY-BASED VOCATIONAL/TECHNICAL CURRICULUM SERIES

INTRODUCTION TO MACHINE TRADES

MASAKO T. SHIN, CURRICULUM SPECIALIST, STC, SIU-C

The preparation of this multicultural series was aided financially through funding agreements with the Illinois State Board of Education/Department of Adult, Vocational and Technical Education.

(Contract Numbers: R-33-10-C-0442-400, R-33-21-J-0542-400)

ARDEN L. PRATT, DEAN
E. HOLLIS MERRITT, ASST. DEAN
LARRY HEPBURN, CENTER DIRECTOR

June 1981

INTRODUCTION

The Machine Trades program runs 36 weeks and covers the following training areas: use of measuring tools; benchwork/ tool bit grinding; lathe work; milling work; precision grinding; and combination machine work.

The class meets 2 hours each day in a related education class (a basic education program to improve the student's reading/English/mathematics skills necessary for vocational training and for adequate performance at the entry level of employment) or in GED class (a general education development program to prepare for a high school equivalency test), 1 hour in a shop theory class, and 5 hours in shop work.

During the course of training, the student will learn to perform one or a variety of duties, as a production machine operator, a machine tool operator and/or a machinist apprentice, depending on the student's aptitude, interest, and progress in class.

A prospective student for the machine trades needs, most of all, to possess a determination to acquire the development of the hands, ears, eyes, and the mind to do, to listen, to remember, and to reason.

Training in the Machine Trades can begin with the very basic and elementary principles and methods and advance, step by step, to various stages of application. However, the student must remember that a machine is only a tool for a machinist to work with, and that knowing how to operate the machine alone is never sufficient to become a good machinist.

A successful candidate for Machine Trades must have the following personal attributes: orderliness, respect for a machine, accuracy, efficiency, judgement, and confidence.

Upon successful completion of the training program, an above-average student will earn the equivalent of one year in apprentice training as a machinist and find job opportunities waiting in a wide range of industries.

MACHINE TRADES: DUTY-TASK INDEX

I. BENCHWORK AND DRILL PRESS

1. Machine a drill grinding gage.
2. Machine 1/16" through 1/2" drill gage (29 holes).
3. Machine tool bit grinding gage.

II. GRINDING WORK

1. Practice tool bit grinding.

III. LATHE WORK

1. Practice the turning operation.
2. Work a practice piece - turning operation.
3. Machine a slide hammer. (Optional)
4. Machine a screw (Part A) for a planer jack.
5. Machine a screw (Part B) for a planer jack.
6. Machine a coupling (Part C) for a planer jack.
7. Machine a cone for a planer jack.
8. Machine a base for a planer jack.
9. Machine a mandrel (Part D) for a planer jack.
10. Machine a spindle-shaft test bar.
11. Machine an extender for a planer jack.

IV. MILLING MACHINE AND GRINDING WORK

1. Machine two step blocks.
2. Machine a body for a machinist vise.
3. Machine a movable jaw for a machinist vise.
4. Machine a plate (slide) for a machinist vise.
5. Machine a jaw face for a machinist vise.
6. Machine a vise screw for a machinist vise.
7. Machine a vise handle for a machinist vise.

V. MILLING AND PRECISION GRINDING WORK

1. Machine an edge finder.
2. Machine a V-block.
3. Machine a V-block yoke.
4. Machine 1-2-3 blocks.
5. Machine an angle plate.

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TRANSLATED BY

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E. HOLLIS MERRITT, ASST. DEAN
LARRY HEPBURN, CENTER DIRECTOR

INTRODUCCIÓN

El programa en Oficios de la Mecánica es de 36 semanas e incluye el adiestramiento en lo siguiente: empleo de la herramienta de medición; trabajo de banco/afilado de cuchillas, brocas, y otras herramientas; trabajo de torno; trabajo de fresadora; rectificaciones de precisión; y trabajos combinados en máquinas-herramienta.

La clase se reúne diariamente durante 2 horas en conjunto con las clases de educación afín (un programa de educación básica para mejorar las habilidades del alumno en la lectura/inglés/matemática necesarias para el entrenamiento vocacional y para poder trabajar adecuadamente al entrar en un empleo), o en las clases de Desenvolvimiento General Educativo (GED) (un programa educativo general para preparar por el examen de equivalencias en la educación secundaria y preparatoria (High School), una hora en teoría de trabajo de taller, y 5 horas en el taller.

Durante el adiestramiento, el alumno aprenderá a llevar una o varias actividades tales como operario de maquinaria de producción, de máquinas-herramienta, y/o aprendiz de mecánico, según sus aptitudes, aplicación y progreso en las clases.

El futuro alumno del programa de adiestramiento en los oficios de la mecánica necesita más que nada, la determinación de desenvolverse en manos, oído, ojos y mentalidad y la resolución de escuchar, recordar y razonar.

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El adiestramiento en los Oficios de la Mecánica puede comenzar con los métodos y principios más básicos y elementales, para después avanzarse, paso por paso, hasta varias etapas de aplicaciones. Sin embargo, el alumno deber recordar que una máquina es sólo una herramienta para el trabajo del mecánico, y que el saber operar la máquina en sí mismo y solo no es nunca lo suficiente para que uno se convierta en buen mecánico.

El éxito de un alumno en los oficios de la mecánica depende enteramente de los siguientes atributos personales: el trabajo metódico, el respecto por la máquina, la exactitud, la eficiencia, el buen juicio, y la confianza en sí mismo.

Al terminar con éxito el programa de adiestramiento, un alumno superior se quedará con el equivalente de un año en el aprendizaje de mecánico. Entonces debe de encontrar la oportunidad de trabajar que lo espere en un amplio campo de industrias.

MACHINE TRADES: DUTY-TASK INDEX

OFICIOS DE LA MECÁNICA: RELACIÓN DE DEBERES Y TAREAS

I. TRABAJOS DE BANCO Y PRENSA TALADRADORA

1. Elaborar a máquina una galga de afilado de brocas.
2. Elaborar a máquina una galga de brocas de 29 agujeros desde 1/16 pulgada hasta 1/2 pulgada.
3. Trabajar a máquina una galga de afinado de cuchillas.

II. TRABAJO DE AFILADO

1. Prácticas en el afilado de brocas.

III. TRABAJO DE TORNO

1. Ensayar la operación del torneado.
2. Trabajar una pieza de ensayo del torneado.
3. Elaborar a máquina en el torno (tornear) un martillo de pistón (opicional).
4. Elaborar a máquina (tornear) un tornillo (Parte A) para un gato de cepilladora.
5. Tornear (Parte B) un tornillo para un gato de cepilladora.
6. Tornear un manguito (Parte C) para un gato de cepilladora.
7. Tornear una extensión y mandrel para un gato de cepilladora.
8. Tornear una base para un gato de cepilladora.
9. Tornear un cono para un gato de cepilladora.
10. Tornear una barra testigo de husos (una especie de galga o probadora).

IV. OPERACIÓN DE FRESADORAS Y TRABAJOS DE RECTIFICADO

1. Elaborar (a máquina) dos bloques calibradores a escalones.
2. Elaborar el cuerpo de una prensa sujetadora de mecánico.
3. Elaborar la quijada (mordaza) móvil de la prensa sujetadora.
4. Elaborar el plato de la prensa sujetadora.
5. Elaborar las caras de la quijada y del cuerpo de la prensa sujetadora.
6. Elaborar el husillo de la prensa sujetadora.
7. Elaborar la manija de la prensa sujetadora.

MACHINE TRADES: DUTY-TASK INDEX

OFICIOS DE LA MECÁNICA: RELACIÓN DE DEBERES Y TAREAS

V. TRABAJO DE FRESADORA Y DE RECTIFICADO DE PRECISION

1. Elaborar un calibrador de cantos.
2. Elaborar un bloque metálico con ranuras en V.
3. Elaborar la horquilla de un bloque en V.
4. Elaborar un bloque calibrador combinado de 1, 2, y 3 pulgadas.
5. Elaborar una escuadra de ángulo o soporte de escuadra.

INTRODUCTION TO MACHINE TRADES

LAOTIAN VERSION

CAREER DEVELOPMENT CENTER
SCHOOL OF TECHNICAL CAREERS
SOUTHERN ILLINOIS UNIVERSITY
CARBONDALE, ILLINOIS

COMPETENCY-BASED VOCATIONAL/TECHNICAL CURRICULUM SERIES

INTRODUCTION TO MACHINE TRADES

LAOTIAN VERSION

MASAKO T. SHIN, CURRICULUM SPECIALIST, STC, SIU-C

TRANSLATED BY

SOMCHAI THIPKHOSITHKUN

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ARDEN L. PRATT, DEAN
E. HOLLIS MERRITT, ASST. DEAN
LARRY HEPBURN, CENTER DIRECTOR

June 1981

ຄຳນຳ.

ຫຼັກສູດຊ່າງກຶງໂລຫະ ຈະໃຊ້ເວລາ 36 ອາທິດ ຄວບຄຸມການຝຶກສອນຫຼາຍດ້ານດັ່ງນີ້: ການໃຊ້ເຄື່ອງມື ສຳລັບວັດແທກ, ການເຮັດວຽກເທິງໂຕ໊ະ ເຊັ່ນ: ການຝົນປາຍມີດ ສຳລັບກຶງໂລຫະ (tool bit), ວຽກກ່ຽວກັບເຄື່ອງກຶງຊະນິດນອນ, ວຽກກ່ຽວກັບເຄື່ອງກຶງຕັ້ງຊື່; ການຝົນຢ່າງລະອຽດ ແລະ ວຽກເກືອບທຸກຢ່າງ ທີ່ກ່ຽວກັບເຄື່ອງຈັກທັງຫຼາຍ.

ແຕ່ລະວັນຈະມີວິຊາຮຽນໃນຫ້ອງຮຽນ ວັນລະສອງຊົ່ວໂມງ ກ່ຽວກັບວິຊາທີ່ກ່ຽວຂ້ອງກັບການຝຶກ (Related education class) ວິຊາທີ່ເອົາມານີ້ເປັນສ່ວນນຶ່ງທີ່ຊ່ວຍປັບປຸງຄວາມຮູ້ທົ່ວໄປຂອງນັກຮຽນ ກ່ຽວກັບການງານ, ຄວາມຮູ້ທາງພາສາອັງກິດ, ຄວາມຮູ້ກ່ຽວກັບເລກຄະນິດ. ທີ່ຈຳເປັນສຳລັບເຂົ້າເຮັດວຽກ ຫຼື ການຕຽມຕົວເພື່ອສອບທຽບເທົ່າ ມັທຍົມຕອນປາຍ. ນອກຈາກນັ້ນ ນັກຮຽນຈະໄດ້ຮັບການຝຶກສອນທາງທິສດີ ອີກນຶ່ງຊົ່ວໂມງ ແລະ ສ່ວນທີ່ເຫຼືອ ອີກ 5 ຊົ່ວໂມງ ສຳລັບການຝຶກທາງດ້ານປະຕິບັດ.

ໃນລະຫວ່າງການຝຶກສອນນັ້ນ, ນັກຮຽນຈະຮຽນຮູ້ ມະລາຍາດ ສະແດງວຽກການ ແລະ ໜ້າທີ່ຕ່າງໆຂອງຊ່າງ ກຶງນັ້ນ ເລີດ

ສິ່ງຂອງ. ຊ່ວງທໍ ຫຼື ຊ່ວງແຮັດເພື່ອນີ້ ຈະໄດ້ຮັບຄວາມຊຳນານ ຈະຂຶ້ນຢູ່ກັບຄວາມສາມາດ ທີ່ຕິດຕາມມາ, ຄວາມສົນໃຈໃນວຽກ ແລະ ຄວາມກ້າວໜ້າໃນມັນຊັນ.

ນັກຮຽນທີ່ຈະມາເຂົ້າຝຶກຮຽນວຽກຊ່າງທໍ ຈະຕ້ອງມີຄວາມຕັ້ງໃຈ ຢ່າງເດັດດ່ຽວ ທີ່ຈະຮຽນຮູ້ ແລະ ຮັບເອົາການສ້າງຄວາມສຳນານຂອງມື, ຫູ, ຕາ ແລະ ຄວາມຕັ້ງໃຈທີ່ຈະເຮັດ, ຝຶກຄວາມຈຳ ແລະ ຮູ້ໄຈ້ເຫດຜົນ.

ການຝຶກຝົນຂອງວຽກຊ່າງທໍ ຈະເລີ່ມຕົ້ນດ້ວຍ ຫຼັກການ ແລະ ວິທີການ ຢ່າງງ່າຍໆ ກ່ອນ ແລ້ວຄ່ອຍກ້າວໜ້າ ທີລະຂັ້ນ ຈົນເຖິງຂັ້ນສູງ. ຢ່າງໃດກໍຕາມ, ນັກຮຽນຈະຕ້ອງຈົດຈຳໄວ້ວ່າ ເຄື່ອງຈັກເປັນພຽງເຄື່ອງມື ສຳລັບຊ່າງທໍ ທີ່ໃຊ້ໃນການເຮັດວຽກ ແລະ ຮູ້ວ່າການມີຄວາມຮູ້ທີ່ຈະແລ່ນເຄື່ອງຈັກເຫຼົ່ານັ້ນ ຈະບໍ່ເປັນສິ່ງພຽງພໍທີ່ຈະກາຍເປັນຊ່າງທໍທີ່ດີເດັ່ນ.

ນັກຮຽນທີ່ຈະຮຽນສຳເລັດໄດ້ ຈະຕ້ອງມີຄຸນສົມບັດລວມຕົວດັ່ງນີ້: ຄວາມເປັນລະບຽບຮຽບຮ້ອຍ, ຮູ້ຈັກເຄົາລົບເຄື່ອງຈັກ, ມີຄວາມທ່ຽງທຳ, ມີຄວາມສາມັກພາບ, ມີການຕັດສິນໃຈທີ່ຖືກຕ້ອງ ແລະ ມີຄວາມໝັ້ນໃຈໃນການເຮັດວຽກ.

ຫຼັງຈາກການຈົບຫຼັກສູດການສອນແລ້ວ, ນັກຮຽນທີ່

ໃນ ຄວາມ ສາມາດ ເພີ່ມ ທົ່ວໆ ລາຍ ສະເລັ່ງ ຈະໄດ້ ຮັບ ຄວາມຮູ້ ນານາ ເທົ່າ ທັນ ການ ສຶກສາ ປີ ເພື່ອນ ຊ່າງ ທີ ທັງຫຼາຍ ແລະ ຈະ ຫາ ໂອກາດ ເຂົ້າ ເຮັດ ວຽກ ກັບ ໂຮງງານ ອຸດ ສາຫະ ກັມ ບໍ່ ຄ່ອຍ ຈະ ລຳ ບາກ ຫຼາຍ.

MACHINE TRADES: DUTY-TASK INDEX

ສາຂາ: ບານ. ໜ້າທີ່ແລະ ວຽກການຂອງການກຶງ.

I. BENCHWORK AND DRILL PRESS ວຽກຢູ່ເທິງໂຕ໊ະ ແລະ ເຄື່ອງເຈາະໂດຍໃຊ້ ສ່ວນຈະນິດຕັ້ງໂຕ໊ະ.

1. ເຈາະ 3 ເຮັດເຄື່ອງວັດຂະໜາດທີ່ໃຊ້ສຳລັບຝົນ.
2. ເຈາະຮູ ຈາກ 1/16 ນິ້ວ ຈົນເຖິງ 1/2 ນິ້ວເພື່ອເຮັດເຄື່ອງວັດ (29 ຮູ).
3. ກຶງໃບມີດສຳລັບຝົນເຄື່ອງວັດ

II. GRINDING WORK ວຽກກ່ຽວກັບການຝົນ.

1. ຝຶກຫັດການຝົນໃບມີດ.

III. LATHE WORK ວຽກກ່ຽວກັບການກຶງ.

1. ຝຶກການແລ່ນເຄື່ອງກຶງ
2. ການຝຶກໃຫ້ຮູ້ເຄີຍໃນເຄື່ອງກຶງ.
3. ການເຮັດຄ້ອນສຳລັບຕີ (Slide Hammer).
4. ກຶງຕະປູກຽວ (Part A) ສຳລັບ Planer Jack.
5. ກຶງຕະປູກຽວ (Part B) ສຳລັບ Planer Jack.
6. ກຶງຂໍ້ຕໍ່ (Part C) ສຳລັບ Planer Jack.
7. ກຶງຫົວຕໍ່ ແລະ ດ້າມຈັບ Handrel ສຳລັບ Planer Jack.
8. ກຶງຖານເຫຼັກ ສຳລັບ Planer Jack.
9. ກຶງທວຍ ສຳລັບ Planer Jack.
10. ກຶງແຜ່ນເຫຼັກທີ່ໝູນໄດ້ ສຳລັບເທັດກອງ.

IV. MILLING MACHINE AND GRINDING WORK

ເຄື່ອງຊາຕໂລນະ ແລະ

ວຽກ ການຝົນ.

1. ກີງທ່ອນເຫຼັກ 4 ຫຼ່ຽມ ໃຫ້ມີສອງມັນ.
2. ກີງລຳຕົວ ເພື່ອໃຊ້ເຮັດອັນຈັບຂອງຊ່າງຕີ.
3. ກີງປາກອັນຈັບທີ່ເຄື່ອນໄດ້ ສຳລັບເຄື່ອງຈັບຂອງຊ່າງຕີ.
4. ກີງແຜ່ນເຫັກ ສຳລັບ ອັນຈັບຂອງຊ່າງຕີ.
5. ກີງໜ້າຂອງປາກ ສຳລັບເຄື່ອງຈັບ.
6. ກີງຕະປກຽວ ສຳລັບເຄື່ອງຈັບ.
7. ກີງອັນດື ຫຼຸ ຈັບ ສຳລັບເຄື່ອງຈັບ.

V. MILLING AND PRECISION GRINDING WORK

ການກີງແປະຊາກ ແລະ

ການຝົນຢ່າງລະອຽດ.

1. ກີງເຄື່ອງວັດດ້ານສັງ.
2. ກີງ V - block.
3. ກີງ V - block york.
4. ກີງ 1-2-3 Block.
5. ກີງ Angle plate.

Technical Lexicon:

English
English/Spanish
English/Laotian

CE 029 813

MACHINE TRADES TECHNICAL TERMS

CAREER DEVELOPMENT CENTER
SCHOOL OF TECHNICAL CAREERS
SOUTHERN ILLINOIS UNIVERSITY
CARBONDALE, ILLINOIS

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MACHINE TRADES: General Terms

angle: the shape made by two straight lines meeting in a point; the amount of difference in space between those lines measured in degrees (°).

alloys: formerly a less valuable metal mixed with a more valuable one, often to give hardness.

bevel: a tool consisting of a ruler with a movable arm; used in measuring or making angles; an angle other than a right angle.

clamp: any of various devices for fastening things together or for bracing parts.

density (relative weight): the ratio of the mass of an object to its weight.

file: a steel tool with a rough, ridged surface for smoothing, grinding down or cutting through.

hone: a fine grained, hard stone used to sharpen cutting tools.

machinability: that quality of metals that can be shaped, finished, etc. by machines.

malleability: that quality of metals that can be hammered, pounded, or pressed into various shapes without breaking.

parallel: extending in the same direction and at the same distance apart at every point as lines, planes, etc.; having parallel parts or movements as some machines and tools.

polish: to smooth and brighten as by rubbing.

smooth: having an even or level surface; having no roughness that can be seen or felt.

taper: to decrease gradually in width or thickness; to become smaller gradually toward one end.

temper: to bring to the proper texture, consistency, hardness, etc. by treating in some way: to temper steel by heating and sudden cooling.

tensile: capable of being stretched.

tensile strength: resistance to lengthwise stress, measured (in weight per unit area) by the greatest load pulling in the direction of length that a given substance can bear without tearing apart.

truing: fitting, placing, or shaping accurately.

wedge: a piece of hard material, as wood or metal, tapering from a thick back to a thin edge that can be driven into a narrow opening any action that serves to open the way for a gradual change.

MACHINE TRADES: Grinding Terms

abrasive: a substance used for grinding, polishing and lapping.

accuracy: conformity in dimension to an exact standard.

alumina: unfused aluminum oxide.

aluminum oxide: an abrasive made by fusing the mineral Bauxite.

Alundum: Norton Company's registered trademark for fused alumina, an abrasive made by melting the mineral Bauxite in an electric furnace.

arbor: the spindle of the grinding machine on which the wheel is mounted.

arbor hole: the hole in a grinding wheel sized to fit the machine arbor.

arc of contact: that portion of the circumference of a grinding wheel touching the work being ground.

area of contact: the total area of the grinding surface of a grinding wheel in contact with the work being ground.

Bauxite: a mineral ore high in aluminum oxide content, from which Alundum abrasive is manufactured.

bearing: point of support. The part of a machine in which the spindle revolves.

bench stand: an off-hand grinding machine, mounting either one or two wheels mounted on a horizontal spindle, attached to a bench.

blotter: a disk of compressible material, usually of blotting paper stock, used between a wheel and flanges when mounting.

bond: the material in a grinding wheel which holds the abrasive grains together.

Boron Carbide: the hardest material ever made commercially by man.

burning (the work): a change in the work being ground caused by the heat of grinding, usually accompanied by a surface discoloration.

bushing: the material, usually lead, babbitt, or aluminum, which sometimes serves as a lining for the hole in a grinding wheel.

center-hole lapping: the cleaning or lapping of center holes with a bonded abrasive wheel cemented onto a steel spindle.

centerless grinding: grinding the outside or inside diameter of a round piece not mounted on centers.

centers: conical steel pins of a grinding machine upon which the work is centered and rotated during grinding.

chatter marks: surface imperfections on the work being grounded, usually caused by vibrations between the wheel and the work.

chuck: a device for holding grinding wheels of special shape or the workpiece being ground.

coated abrasives: paper or cloth having abrasive grains bonded into the surface.

coolant: the liquid or solution used to cool the work and to prevent it from rusting.

corner wear: the tendency of a grinding wheel to wear on a corner so that it does not grind sharp corners without fillets.

corundum: a natural abrasive of the aluminum oxide type, of higher purity than emery.

crush dressing: the process of using steel rolls to form or dress grinding wheels to a wide variety of shapes.

cutting-off wheel: a thin wheel, usually made with an organic bond, for cutting off.

cutting surface: the surface or face of the wheel against which the material is ground.

cylindrical grinding: grinding the outside surface of a cylindrical part mounted on centers.

MACHINE TRADES: Grinding Terms - (cont.)

diamond tool: a diamond dresser.

diamond wheel: a grinding wheel in which the abrasive is natural bort diamond.

discoloration: see burning (the work).

dog: a device attached to the work piece by means of which the work is revolved.

dressers: tools used for dressing a grinding wheel.

dressing: a grinding wheel is dressed to improve or alter its cutting action.

ductile: capable of being readily pressed or drawn or otherwise formed into various shapes.

emery: a natural abrasive of the aluminum oxide type.

external grinding: grinding on the outside surface of an object as distinguished from internal grinding.

face: that part of a straight wheel on which cylindrical and surface grinding is usually done.

feed-cross: surface grinding. The distance of horizontal feed of the wheel across the table.

feed-down: surface grinding. The rate at which the abrasive wheel is fed into the work.

finish: the surface quality or appearance, such as that produced by grinding or other machining operation.

finishing: the final cuts taken with a grinding wheel to obtain accuracy and the surface desired.

floor-stand grinders: an offhand grinder, mounting either one or two wheels running on a horizontal spindle fixed to a metal base attached to the floor.

freehand grinding: grinding by holding the work against the wheel by hand , usually called offhand grinding.

generated heat: heat resulting from the removal of metal by a grinding wheel.

glazing: the dulling of the cutting particles of a grinding wheel resulting in a decreased rate of cutting.

grade: the strength of bonding of a grinding wheel, frequently referred to as its hardness.

grain: abrasive classified into predetermined sizes for use in polishing, in grinding wheels and in coated abrasive.

grain size: the size of the cutting particles of a grinding wheel or polishing abrasive.

grain spacing: the relative position of the cutting particles in a grinding wheel.

grinding: removing material with a grinding wheel.

grinding action: refers to the cutting ability of, and the finish produced by, a grinding wheel.

grinding machines: any machine on which a grinding wheel is operated.

grinding wheel: a cutting tool of circular shape made of abrasive grains bonded together.

honing: an abrasive operation typically performed on internal cylindrical surfaces and employing bonded abrasive sticks in a special holder to remove stock and obtain surface accuracy.

hoods: metal guards used for protection against wheel breakage.

Huntington Dresser: a tool using star-shaped cutters for truing and dressing grinding wheels, invented by a man named Huntington.

internal grinding: grinding the inside surface of the hole in a piece of work.

lapping: a finishing process typically employing loose abrasive grain, but now often including similar types of operation with bonded abrasive wheels or coated abrasives.

loading: filling of the pores of the grinding wheel surface with the material being ground, usually resulting in a decrease in production and poor finish.

lubricant: the liquid or solution used to lubricate the wheel and promote a more efficient cutting action.

mounting: putting a grinding wheel on the arbor or spindle of the machine.

natural abrasive: a hard mineral found in nature.

off-grade: bonded abrasive materials which are not of exact grade.

offhand grinding: where the work is held in the operator's hand, otherwise known as freehand grinding.

oilstone: a natural or manufactured abrasive stone impregnated with oil and used for sharpening keen-edged tools.

operating speed: the speed of revolution of a grinding wheel expressed in either revolutions per minute or surface feet per minute.

organic bond: a bond made of organic materials such as the synthetic resins, rubber or shellac.

peripheral speed: the speed at which any point or particle on the face of the wheel is traveling when the wheel is revolved, expressed in surface feet per minute (s.f.p.m.). Multiply the circumference in feet by the wheel revolutions per minute.

periphery: the line bounding a rounded surface - the circumference of a wheel.

precision work: work that is required to be exact in measurements, finish, etc. Work that must be ground with great care.

production: the quantity of product turned out or the amount of work done in a given time or during the life of a grinding wheel.

recessed wheels: grinding wheels made with a depression in one side or both sides to fit special types of flanges or sleeves, provided with certain grinding machines.

resinoid bond: a bonding material described commercially as synthetic resin.

Rockwell Hardness Tester: a machine used for testing the indentation hardness of all metals.

roll-grinding machine: a machine for grinding cylindrical rolls used for rolling metal, paper or rubber.

rough grinding: the first grinding operation for reducing stock rapidly without regard to the finish the wheel leaves.

r.p.m.: revolutions per minute.

rubber bond: a bonding material the principal constituent of which is natural rubber or synthetic rubber.

rubber wheels: wheels made with rubber bond.

safety devices: devices for the protection of operators and machines in case of accident.

scale: a black, scaly coating on the surface of heated steel and upon other metals - as in forging and rolling.

scratches: marks left on a ground surface caused by a dirty coolant or a grinding wheel unsuited for the operation.

s.f.p.m.: surface feet per minute. See peripheral speed. Multiply the circumference in feet by the wheel revolutions per minute.

sharpening stone: a natural or manufactured abrasive stone, usually of oblong shape, used for sharpening or whetting tools.

shellac bond: a bonding material the principal constituent of which is shellac.

silicate bond: type of bond matured by baking, in which silicate of soda is an important bonding constituent.

silicon carbide: an abrasive made from coke and silica sand-Norton Crystolon (SiC).

MACHINE TRADES: Grinding Terms - (cont.)

straight wheel: a grinding wheel of any dimension which has straight sides, a straight face, and a straight or tapered arbor hole, and is not recessed, grooved, dovetailed, beveled, or otherwise changed from a plain straight wheel.

structure: a general term referring to the proportion and arrangement of abrasive and bond in an abrasive product.

structure number: a term designating the relative grain spacing in an abrasive product. Dense relative spacing corresponds to low numbers such as 0, 1, 2, etc.; open spacing to higher numbers - 10, 11, 12.

surface grinding: grinding a plane surface.

surface-grinding machine: a machine for grinding plane surfaces.

table: that part of the grinding machine which directly or indirectly supports the work being ground.

table traverse: reciprocating movement of the table of a grinding machine.

tapered wheel: a grinding wheel shaped similar to a straight wheel but having a taper from the hub of a wheel to the face and thus being thicker at the hub than at the face.

temper: the heat-treatment of a material to develop required qualities.

tensile strength: the strength of a material when tested in tension, usually given in pounds per square inch.

treatment: a material impregnating an abrasive product aiming to improve its grinding action, often by reducing the tendency for loading in use.

truing: a grinding wheel is trued in order to restore its cutting face to running truth, so that it will produce perfectly round (or flat) and smooth work; or to alter the cutting face for grinding special contours.

vitrified bond: a bonding material of which the chief constituent is clay.

wheel speed: the speed at which a grinding wheel is revolving, measured either in revolutions or in surface feet per minute.

wheel traverse: the rate of movement of the wheel across the work.

work: used to designate the material being ground in a machine.

work speed: in cylindrical, centerless, and internal grinding, the rate at which the work revolves, measured in either r.p.m. or s.f.p.m.; in surface grinding, the rate of table traverse measured in feet per minute.

MACHINE TRADES: Lathe Parts - Names and Functions

apron: houses all carriage-feed mechanisms and controls.

apron handwheel: used to move the carriage-assembly manually.

back gear: allows the operator to select a secondary set of speeds which are slower.

back gear lever: used to engage the back gear.

bed: main casting to which all other lathe parts are fastened.

belt tension lever: tightens or loosens the belt on the cone pulley.

clutch knob or lever: engages the carriage-feeds: cross-slide and carriage-feed.

compound rest: used to cut angles and short tapers.

cone pulley: used to select various spindle speeds.

cross feed knob: moves cross-slide for facing operations

dog plate. used to rotate the work held between centers by means of a lathe dog.

feed reverse lever: change the direction of rotation of the lead-screw.

feed selector lever: three position lever used to obtain cross-slide, carriage-feed or a neutral position for threading.

half nut lever: used for threading only.

head stock bearing: supports the head stock spindle and allows it to rotate freely.

head stock spindle: all work-holding-devices are fastened to the spindle which rotates them.

lead screw: used for threading only.

legs: used to support the bed of the lathe.

MACHINE TRADES: Lathe Parts - page 2

quick change gear box: used to select various feeds per inch or threads per inch.

rack: allows carriage-assembly to be moved manually or by power feed.

saddle: main casting of the carriage-assembly which rides the ways of the lathe: A carriage-assembly consists of saddle, apron, cross-slide, compound rest and tool post.

sliding gear: used for threading and feeds per inch.

tail stock: main casting of the tail-stock assembly.

tail stock binding lever: locks a tail-stock-spindle in place.

tail stock handwheel: used to move tail-stock-spindle or adjust dead center when working between centers.

tail stock spindle: used to hold drills, reamers, jacobs chuck or a center to support the work when working between centers.

threading dial indicator: used for threading only.

tool post: holds tool-holder or large tool bite.

top lever: used to select threads per inch or feeds per inch.

tumbler lever: used to select threads per inch or feeds per inch.

ways: keep the head stock, tail stock, and carriage-assembly all in line.

MACHINE TRADES: Lathe - Screw-Thread Terms

angle of thread: the angle included between the sides of the thread measured in an axial plane.

axis of a screw: the longitudinal central line through the screw.

crest: the top surface joining the two sides of a thread.

depth of engagement: the depth of thread contact of two mating parts, measured radially.

depth of thread: the distance between the crest and the root of a thread measured normal to the axis.

external thread: a thread on the outside of a member.

half angle: the angle included between the sides of the thread measured in an axial plane.

helix angle: the angle made by the helix of the thread at the pitch diameter with a plane perpendicular to the axis.

internal thread: a thread on the inside of a member.

lead: the distance a screw thread advances axially in one turn. On a single-thread screw, the lead and the pitch are identical; on a double-thread screw, the lead is twice the pitch; on a triple-thread screw, the lead is three times the pitch, etc.

length of engagement: the length of contact between two mating parts, measured axially.

major diameter: the largest diameter of a screw thread. The term major diameter applies to both internal and external threads, and replaces the term outside diameter as applied to the thread of a screw, and also the term full diameter as applied to the thread of a nut.

minor diameter: the smallest diameter of a screw thread. The term minor diameter applies to both internal and external threads, and replaces the terms core diameter and root diameter as applied to the thread of a screw and also the term inside diameter as applied to the thread of a nut.

pitch: the distance from a point on a screw thread to the corresponding point on the next thread measured parallel to the axis.

pitch diameter: the diameter of an imaginary cylinder the surface of which would pass through the threads at such points as to make equal the widths of the threads and the widths of the grooves cut by the surface of the cylinder. It is equal to the major diameter less an amount equal to the single depth of thread.

root: the bottom surface joining the sides of two adjacent threads.

screw thread: a screw thread may be visualized as a flexible form, like a piece of string that has been wrapped around a cylinder, or the sides of a cylindrical hole, at a uniform rate of advance, producing a form known as a helix. It may also be considered as a raised form produced on the outside of a cylinder, or on the inside walls of a cylindrical hole, after a thread-cutting operation has been completed.

side: the surface of the thread which connects the crest with the root.

thickness of thread: the distance between adjacent sides of the thread measured along or parallel to the pitch line.

MACHINE TRADES: Milling-Machine Parts - Names and Functions

adjustable arm braces: added adjustable support for the overarm.

coolant distributor: nozzle from which the cutting coolant is fed to work.

coolant-pump switch: starts and stops the coolant pump.

electrical-control compartment: contains all electrical controls for the machine.

feed and fast-travel motor: provides power for all feed and fast-travel movements, independent of spindle drive.

feed-selector lever and dial: single lever selects all feed rates. One turn in either direction gives feed change. Dial shows rate engaged.

inner arbor yoke: yoke between column and outer arbor yoke, used to support the arbor on the inside.

knee-clamp lever: knee is quickly clamped by single lever from operating position; lever used to clamp the knee.

longitudinal adjustment handcrank: crank turned by hand to adjust the longitudinal position of the table.

longitudinal feed-control lever: lever used to control the direction of movement of the table; controls longitudinal feed.

machine start-stop lever: lever to start and stop the machine.

main-disconnect switch: sort of a safety switch that disconnects all electrical switches in the electrical compartment.

motor-driven centrifugal coolant pump: used to force the coolant through the nozzle; starts and stops with the machine spindle; can be stopped separately by switch at side of column.

outer arbor yoke: yoke at end of overarm used for the outer support of the arbor.

MACHINE TRADES: Milling Machine Parts - (cont.)

overarm-clamp lever: used to clamp the overarms.

overarms: used for positioning the inner and outer arbor yokes.

power fast-travel lever: lever gives power fast travel in any direction of feed engaged, with spindle and feed drive either running or stopped.

saddle-clamp lever: lever used to clamp the saddle in place.

speed-selector lever and dial: single lever selects all speeds. One turn in either direction gives speed change. Dial shows rate engaged; eighteen rates of spindle speeds are provided, 30 to 1,200 r.p.m. in either direction. Always stop the machine before changing speed.

spindle-jog button: if occasional difficulty should be encountered in changing the speed, a touch of this jog button will remedy the situation.

spindle motor: motor driving the spindle.

spindle-motor reversing switch: switch used to reverse the direction of revolution of the motor that revolves the spindle; reverses spindle.

table-clamp lever: lever used to clamp the table. Longitudinal power feed is locked out when the table is clamped.

table-swivel clamp screw (at front) and clamp nut (under saddle): screw used to clamp swivel table.

transverse-adjustment handwheel: used to adjust transverse feed; adjustable dial reads to 0.001 in.

transverse-feed-control lever: lever controlling the amount of transverse feed.

universal spiral-index center footstock: footstock (at times, called a tailstock) used with the dividing or indexing head.

universal spiral-index center headstock: used for all types and kinds of indexing.

MACHINE TRADES: Milling-Machine Parts - (cont.)

vertical adjustment handwheel: handwheel used to adjust the vertical feed of table; automatically disengaged when power feed is engaged.

vertical-feed-control lever: used to control the vertical feed of table.

MACHINE TRADES: Milling Operation Terms

angular milling: the production of a flat surface at an inclination to the axis of the cutter.

face milling: the production of a flat surface at right angles to the axis of the cutter.

form milling: the production of a surface having an irregular outline.

gang milling: two or more cutters used together on one arbor.

milling flutes: a term applied to the grooving or cutting of flutes on drills, reamers, taps.

plain milling or slab milling: the production of a flat surface parallel to the axis of the cutter.

straddle milling: term applied when two side-milling cutters are used and two sides of a piece are milled at the same time.

MACHINE TRADES: Properties of Metal Terms

brittleness: a property belonging to metals which cannot be deformed permanently. Brittle metals break easily. Cast-iron is brittle, and castings may at times break by just being dropped to the floor of the shop.

ductility: the property of some metals of being able to be drawn from a large size to a smaller size of wires. Metals used for wires are ductile metals.

hardness: the property of a metal which gives it the ability to resist being permanently deformed when a load is applied: the harder a substance, the greater is its resistance to deformation.

strength: the ability of a material to resist deformation. The property of plasticity is usually associated with strength. Strength with plasticity is the most important combination of properties that metal can have. Plasticity may be defined as the ability to take "deformation" without breaking.

toughness: the property of some metals wherein they possess high strength and the ability to deform permanently without rupture.

MACHINE TRADES: Equipment and Tools

1. angle plate
2. arbor
3. arbor press
4. bandsaws:
    - contour bandsaw
    - horizontal cutoff bandsaw
    - vertical cutoff bandsaw
5. blocks:
    - gage blocks
    - set-up blocks
    - v-blocks
6. boring bar holder
7. boring head
8. boring mill, universal
9. boring tool
10. calipers
11. carriage stop
12. center drills
13. center punches
14. chisels
15. chucks:
    - key-type chucks
    - magnetic chucks
    - quick change chucks
16. Clamps
17. clamps and straps
18. collet
19. combination squares
20. counterbore

MACHINE TRADES: Equipment and Tools

21. countersink
22. cutters:
    - deburring tools
    - flycutters
    - milling cutters
    - slab cutters
    - T-slot cutters
23. dial caliper
24. dial indicators
25. diamond dresser
26. dil stone
27. dividers
28. dog
29. drift pins
30. drills
31. drill press, floor type
32. drill press, radial
33. drive pin punches
34. edge finder
35. electric furnace
36. emery cloth
37. end mill
38. face plate
39. face mill
40. files
41. filing machine

42. fixtures

43. flexible scale

44. gages:
    - feeler gage
    - go-no go gage
    - height gage
    - height setting gage
    - planer gage
    - radius gage
    - small hole gage
    - telescoping gage

45. graduated scale

46. grinders:
    - bench grinder
    - carbide grinder
    - hand grinder
    - surface grinder

47. grinding wheels

48. hacksaw

49. hammers

50. hardness tester

51. hold-downs

52. hydraulic press

53. lathe, engine

54. measuring wire, thread and gear

55. micrometers:
    - anvil micrometer
    - depth micrometer
    - dial depth micrometer
    - external micrometer
    - internal micrometer
    - thread micrometer

56. milling machine, horizontal

MACHINE TRADES: Equipment and Tools (cont'd)

57. milling machine, universal
58. milling machine, vertical
59. parallels
60. pliers
61. protractor
62. reamers
63. scale
64. screw drivers
65. screw and top extractors
66. scriber
67. sine bar
68. slab mill
69. stamps, numbering and lettering
70. steady rest
71. straight edge
72. steel tape
73. surface plate
74. swivel vise
75. taper attachment
76. tapered sleeves
77. tapping head
78. taps
79. threading dies
80. tool holder

MACHINE TRADES: Equipment and Tools (cont'd)

81. tool post
82. transfer screws and punches
83. universal head
84. vernier caliper
85. vises
86. work holding jaws
87. wrenches

MACHINE TRADES: Measuring Tools

1. bevel protractor with vernier
2. calipers:
    - hermaphrodite calipers
    - inside calipers
    - inside transfer calipers
    - outside calipers
    - outside transfer calipers
    - vernier calipers: (reads .001)
3. center gages
4. combination square with center and protractor heads
5. dial indicator: .001 and .0001
6. dividers
7. gage blocks
8. micrometers:
    - depth micrometer
    - inside micrometer
    - outside micrometer
    - thread micrometer
    - vernier micrometer: (reads .0001)
9. precision square
10. protractor
11. scales: graduated in 64ths, 32nds, 16ths, 8ths, .10, 102, .01.
12. sine bar
13. small hole gages
14. surface gage
15. surface plate
16. telescoping point
17. trammel points
18. vernier depth gage
19. vernier height gage
20. wire standards: (used for pitch diameter - 3 wires)

MACHINE TRADES TECHNICAL TERMS

ENGLISH-SPANISH LEXICON

CAREER DEVELOPMENT CENTER
SCHOOL OF TECHNICAL CAREERS
SOUTHERN ILLINOIS UNIVERSITY
CARBONDALE, ILLINOIS

MACHINE TRADES TECHNICAL TERMS

ENGLISH-SPANISH LEXICON

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MACHINE TRADES: General Terms

OFICIOS DE LA MECÁNICA: Terminología General

angle: ángulo

alloys: aleaciones

bevel: baivel

clamp: mordaza, torno, tornillo, cárcel, prensa

density (relative weight): densidad (masa de la unidad de volumen)

file: lima

hone: piedra de amolar

machinability: maquinabilidad, trabajabilidad

malleability: maleabilidad

parallel: paralelo

polish: pulir

smooth: alijar, lijar

taper: disminución progresiva

temper: temple

tensile: extensible

tensile strength: resistencia a la tracción (en libras x pulgada de ancho o en kilos x milímetros de ancho con referencia al papel)

truing: ajuste, rectificación, enderezado

wedge: cuña

MACHINE TRADES: Grinding Terms

OFICIOS DE LA MECÁNICA: La Terminología del Afinado y de la Rectificación

abrasive: abrasivo

accuracy: exactitud

alumina: alúmina

aluminum oxide: óxido de aluminio

Alundum: alundón

arbor: eje

arbor hole: agujero para el eje

arc of contact: arco de contacto

area of contact: zona de contacto

Bauxite: bauxítica

bearing: cojinete

bench stand: esmeriladora eléctrica de banco

blotter: disco de papel secante

bond: ligadura

Boron Carbide: carburo de boro

burning (the work): quemadura

bushing: manguito

center-hole lapping: acabado del agujero de centrado con un abrasivo

centerless grinding: rectificar sin puntos

centers: punto, contrapunta

chatter marks: marcas por vibración de la herramienta

chuck: plato de sujeción, plato centrador

MACHINE TRADES: Grinding Terms

OFICIOS DE LA MECÁNICA: La Terminología del Afinado y de la Rectificación (Continuación)

coated abrasives: abrasivos sobre soporte flexible

coolant: líquido refrigerador

corner wear: desgaste en la esquina

corundum: corindón

crush dressing: rectificación por medio de un rodillo a presión

cutting-off wheel: disco de troceo

cutting surface: cara superficie cortante

cylindrical grinding: rectificado cilíndrico

diamond tool: herramienta con punta de diamante

diamond wheel: muela adiamantada

discoloration: descoloración

dog: perro (de arrastre)

dressers: herramientas para rectificar las muelas; rectificadora de muela

dressing: rectificación de una muela

ductile: maleable, dúctil

emery: esmeril

external grinding: rectificación por exterior

face: cara, plato al aire

feed-cross: al amolar, la distancia horizontal que camina la muela en la bancada del torno

feed-down: la rapidez con que la muela avanza en el corte (o el avance en el corte)

finish: acabado de maquinado

finishing: acabado

MACHINE TRADES: Grinding Terms

OFICIOS DE LA MECÁNICA: La Terminología del Afinado y de la Rectificación (Continuación)

floor-stand grinders: máquina de afilar, esmerilar, o amolar

freehand grinding: rectificado basto o mano

generated heat: calor engendrado

glazing: embotamiento (de las partículas cortantes de una muela abrasiva)

grade: la resistencia de una ligadura en la muela abrasiva: grado

grain: el grueso de los granos de los abrasivos de acuerdo con una graduación predeterminada: grano

grain size: el grueso del grano del abrasivo

grain spacing: el esparcimiento en la muela de las partículas abrasivas

grinding: el acto de rebajar una superficie amolándola

grinding action: se refiere a la actividad cortante y el acabado que deja una muela

grinding machines: amoladoras, esmeriladoras

grinding wheel: muela

honing: bruñido interior, véase "internal grinding" más adelante

hoods: protector o escudo para la seguridad del operario en caso de la rotura de una muela

Huntington Dresser: rectificador en forma de estrella para usar con las muelas, inventado por un tal Huntington

internal grinding: bruñido interior por lapidado con barretas abrasivas, por ejemplo, el interior de un cilindro

lapping: lapidado, proceso de restregar una superficie contra otra con interposición de abrasivos sueltos

loading: embotamiento o ensuciamiento (relleno) de los poros con el material de la pieza trabajada resultando en disminución de eficiencia

lubricant: lubricante

MACHINE TRADES: Grinding Terms

OFICIOS DE LA MECÁNICA: La Terminología del Afinado y de la Rectificación (Continuación)

mounting: el acto de montar una muela en el eje de la máquina

natural abrasive - (abrasivo natural): un mineral duro encontrado en la naturaleza

off-grade: materiales abrasivos que no son de la calidad indicada, materiales corrientes

offhand grinding: rectificado basto (de una superficie a mano)

oilstone: piedra de aceite, piedra de repasar filos

operating speed: la velocidad de la muela expresada tanto en revoluciones por minuto como por pies de la superficie por minuto

organic bond: ligadura hecha de substancias naturales u orgánicas

peripheral speed: la velocidad con que camina cualquier punto en la superficie o cara de la muela al dar sus vueltas. Se expresa en s.f.p.m.

periphery: la circunferencia de una rueda: periferia

precision work: trabajo de precisión

production: producción

recessed wheels: muelas ahuecadas

resinoid bond: ligadura de (con) un resinoide

Rockwell Hardness Tester: probadora de dureza Rockwell

roll-grinding machine: rectificadora de cilindros de laminador

rough grinding: el acto de desbastar en la muela

r.p.m.: revoluciones por minuto

rubber bond: ligadura de hule o goma

rubber wheels: muela abrasiva ligada con goma

safety devices: aparatos de seguridad o protectores

scale: capa oxidada, costra de óxido

MACHINE TRADES: Grinding Terms

OFICIOS DE LA MECÁNICA: La Terminología del Afinado y de la Rectificación (Continuación)

scratches: estriaciones, rayas

s.f.p.m.: pies de superficie por minuto, véase "peripheral speed"

sharpening stone: piedra de repasar filos

shellac bond: ligadura principalmente de laca

silicate bond: ligadura con silicato de sodio

silicon carbide: carburo de silicio

straight wheel: muela abrasiva plana

structure - estructura: referente a la distribución de ligadura y material abrasivo en la muela

structure number - número de estructura: empleado en la escala 0, 1, 2, 3, hacia 10, 11, 12, etc. para indicar la cantidad de abrasivo en una muela

surface grinding: rectificación de una superficie plana con muela abrasiva

surface-grinding machine: rectificadora de superficies planas exteriores

table: bancada, mesa

table traverse: avance de la mesa

tapered wheel: muela abrasiva más gruesa en el cubo que en la cara

temper: templar, tratamiento por calor para dar temple

tensile strength: resistencia a la tracción

treatment - tratamiento: un material que impregna un producto abrasivo para mejorar su acción moladora

truing: reacondicionamiento de la cara (de muelas abrasivas)

vitrified bond: ligadura vitrificada, principalmente de arcilla

wheel speed: velocidad en r.p.m. de una muela abrasiva

MACHINE TRADES: Grinding Terms

OFICIOS DE LA MECÁNICA: La Terminología del Afinado y de la Rectificación (Continuación)

wheel traverse: la velocidad del movimiento de la muela através del trabajo

work - trabajo: el material que se trabaja

work speed - velocidad de trabajo: en la amoladura cilíndrica, rectificación sin puntos, o interna, la velocidad a que da vueltas el trabajo, medida o en r.p.m. o s.f.p.m,; en la rectificación de una superficie la velocidad del movimiento de la muela através (sobre) el trabajo

MACHINE TRADES: Lathe Parts - Names and Functions

OFICIOS DE MECÁNICO: Órganos del Torno - Nombres y Funciones

apron: carro portaherramientas

apron handwheel: rueda (manivela) de avance a mano

back gear: engranaje reductor

back gear lever: palanca del engranaje reductor

bed: bancada

belt tension lever: palanca tensora de la correa

clutch knob or lever: palanca o perilla del embrague

compound rest: soporte compuesto

cone pulley: polea-cono, polea escalonada

cross feed knob: perilla para el movimiento transversal

dog plate: plato liso

feed reverse lever: palanca de inversión del avance

feed selector lever: palanca selectora de avance

half nut lever: la palanca para el mecanismo de inversión de la barra de roscar (del husillo patrón, del husillo madre)

head stock bearing: cojinete del cabezal

head stock spindle: eje del cabezal

lead screw: husillo

legs: patas o pies del torno

quick change gear box: caja de engranajes de cambio rápido

rack: el husillo de regulación, con manivela

saddle: el carro longitudinal

sliding gear: engranaje del avance longitudinal empleado para

MACHINE TRADES: Lathe Parts - Names and Functions

OFICIOS DE MECÁNICO: Órganos del Torno - Nombres y Funciones

tail stock: casquillo (cañón)

tail stock binding lever: palanca para el bloque o (enclavamiento) del casquillo

tail stock handwheel: volante para el ajuste del casquillo

tail stock spindle: contrapunto

threading dial indicator: indicador de roscado

tool post: portaherramientas

top lever: igual que (tumbler lever)

tumbler lever: palanca selectora, palanca para roscas

ways: guías de la bancada

MACHINE TRADES: Lathe - Screw-Thread Terms

OFICIOS DE MECÁNICO: El Torno - Terminología Referente a la Rosca de los Tornillos

angle of thread: ángulo de la rosca (se mide por el plano axial entre los dos lados de la rosca)

axis of a screw: eje o línea axial de un tornillo. Es la que pasa por el centro de él

crest - cresta: la superficie o punto donde se unen los dos lados del ángulo: el vértice de la rosca

depth of engagement: el hondo de la rosca (en contacto con el correspondiente de tornillo o tuerca)

depth of thread: el saliente de la rosca

external thread: rosca externa

half angle: igual que ángulo de la rosca

helix angle: ángulo helicoidal

internal thread: rosca interna

lead - el paso de la rosca: es la distancia que avanza la rosca en una vuelta

length of engagement - largo del encaje: es decir el largo del contacto entre dos piezas que se casan entre sí medido por el eje

major diameter: diámetro principal

minor diameter: diámetro menor

pitch - espaciado: la distancia en un punto en la rosca a otro punto igual en la próxima vuelta de ella

pitch diameter: diámetro del espaciado

root: fondo de la rosca

screw thread: rosca del tornillo

side - lado: la parte (superficie) de la rosca entre el fondo y la cresta o vértice

thickness of thread: espeso de la rosca

MACHINE TRADES: Milling-Machine Parts - Names and Functions

OFICIOS DE MECÁNICO: Organos de las Fresadoras - Nombres y Funciones

ajustable arm braces: soportes ajustables para el cabezal

coolant distributor: distribuidor del líquido refrigerante

coolant-pump switch: interruptor de la bomba del líquido refrigerante

electrical-control compartment: compartimento de los controles eléctricos

feed and fast-travel motor: motor de avance y de pase rápido

feed-selector lever and dial: palanca e indicador del seleccionador de avance

inner arbor yoke: horquilla interna, soporte del árbol

knee-clamp lever: palanca apretadora (ajustadora) de la abrazadera de la rodilla

longitudinal adjustment handcrank: volante del ajuste longitudinal: manija

longitudinal feed-control lever: palanca del control del avance longitudinal

machine start-stop lever: palanca de arranque y detención de la máquina

main-disconnect switch: interruptor principal del circuito eléctrico

motor-driven centrifugal coolant pump: bomba centrifugal del refrigerante, motorizada (accionada por motor)

outer arbor yoke: horquilla en el extremo del brazo-soporte

overarm-clamp lever: palanca para afianzar la abrazadera del brazo-soporte

overarms: brazos-soportes

power fast-travel lever: palanca mecanizada de avance rápido

MACHINE TRADES: Milling-Machine Parts - Names and Functions

OFICIOS DE MECÁNICO: Organos de las Fresadoras - Nombres y Funciones (Continuación)

saddle-clamp lever: palanca apretadora de la abrazadera del carrito transversal

speed-selector lever and dial: palanca e indicador del seleccionador de velocidad

spindle-jog button: botón para impulsar el husillo (comprobando)

spindle motor: motor accionador del husillo

spindle-motor reversing switch: interruptor inversor del motor accionador del husillo

table-clamp lever: palanca afianzadora de la mesa portapieza

table-swivel clamp screw (at front) and clamp nut (under saddle: tornillo sujetador (adelante) y tuerca del mismo debajo del carrito transversal

transverse-adjustment handwheel: volante de mano ajustador del movimiento transversal

transverse-feed-control lever: palanca de control del movimiento transversal

universal spiral-index center footstock: el cabezal móvil de contrapunta universal e indicador espiral

universal spiral-index center headstock: el cabezal fijo de contrapunta universal e indicador espiral

vertical adjustment handwheel: volante ajustador del movimiento vertical de la mesa portapieza

vertical-feed-control lever: palanca-control del movimiento vertical de la mesa portapieza

MACHINE TRADES: Milling Operation Terms

OFICIOS DE MECÁNICO: Terminología Referente a las Operaciones en la Fresadora

angular milling: fresado de ángulo

face milling: fresado de refrentar

form milling: fresado de forma

gang milling: fresado con tren de fresas

milling flutes: fresado de ranuras (de taladros, escariadores, machos de roscar)

plain milling or slab milling: fresado en superficie plana

straddle milling: fresado paralelo

MACHINE TRADES: Properties of Metal Terms

OFICIOS DE MECÁNICO: Terminología Referente a las Propiedades de los Metales

brittleness: fragilidad, aquebradización

ductility: ductilidad, maleabilidad

hardness: dureza

strength - resistencia: la calidad de un metal que lo permite resistir la deformación

toughness: resiliencia al choque o al desgaste

MACHINE TRADES: Equipment and Tools

OFICIOS DE MECÁNICO: Equipo y Herramientas

- angle plate: escuadra de ángulo, soporte de escuadra
- arbor: portaherramienta
- arbor press: prensa de husillo a mano
- bandsaws: sierra de cinta, sierra sinfin
    - contour bandsaw: sierra de cinta para contornear
    - horizontal cutoff bandsaw: sierra de cinta horizontal
    - vertical cutoff bandsaw: sierra de cinta vertical
- blocks:
    - gage blocks: bloques calibradores
    - set-up blocks: bloques calibradores igual que anteriores
    - v-blocks: bloques metálicos con ranura en "v"
- boring bar holder: mandril de la barra taladradora
- boring head: cabezal de taladrar
- boring mill, universal: torno universal
- boring tool: herramienta para barrenar
- calipers: compás de gruesas
- carriage stop: tope de carro
- center drills: brocas de centrar
- center punches: punzón de marcar, granete
- chisels: tajadera, gubia, cincel, escoplo, formón, buril
- chucks: plato, mandril, portabroca, portaherramienta
    - key-type chucks: portabroca, portaherramienta de paletón
    - magnetic chucks: mandril electromagnético

MACHINE TRADES: Equipment and Tools

OFICIOS DE MECÁNICO: Equipo y Herramientas (Continuación)

quick change chucks: portabroca de cambio rápido, mandril de cambio rápido

Clamps: prensas de mano, mordazas, abrazaderas, prensa de sujección, cárcel, sujetadores

clamps and straps: sujetadores de varios tipos y formas

collet - mandril: de tres quijadas, de quijadas concéntricas, extensible, tetragarra, etcétera

combination squares: escuadra combinada con transportador y localizador de centros

counterbore: escariador, herramienta para ensanchar un agujero en una parte de su profundidad

countersink - v. avellanar: n. avellanador

cutters: cortadores

deburring tools: herramientas para desbarbar o para quitar rebabas

flycutters: fresa perfilada simple, fresa madre cónica, fresa para chaveteros, cuchilla suelta para barrenar

milling cutters: fresas cortadoras

slab cutters: fresas para dar acabado a superficies planas

T-slot cutters: fresas para cortar ranuras "T"

dial caliper; dial type micrometer gage: galga micrométrica de cuadrante para medición de interiores y exteriores

dial indicators: indicador de cuadrante

diamond dresser: moleta de diamante (para rectificar muelas abrasivas)

oil stone: piedra de aceite

dividers: compás de puntas secas, compás de dividir

dog: perro de torno, perro de arrastre

drift pins: pernos cónicos

MACHINE TRADES: Equipment and Tools

OFICIOS DE MECÁNICO: Equipo y Herramientas (Continuación)

drills: barrenos, barrenadores, brocas, taladros

drill press, floor type: perforadora de columna, taladradora, prensa taladradora

drill press, radial: taladradora radial

drive pin punches: punzones para meter o sacar chaveta

edge finder: dispositivo para colocar la portaherramientas (el huso) sobre la pieza a trabajar

electric furnace: electrohorno

emery cloth: tela de esmeril

end mill: fresa radial, fresa de espiga

face plate: plato liso

face mill: fresa de refrentar, fresa cilíndrica

files: limas (de alisar, de corte, de cuchillo, basta, bastarda, de aguja, etc.

filing machine: limadora

fixtures: accesorios o dispositivos para asir el trabajo y sujetarlo

fixtures scale: escala (galga) premarcada para indicar las medidas de las piezas a labrar

gages: galgas, calibradores, tientas, escalas, calibres, etcétera

- feeler gage: calibrador de verificación de piezas, tienta para espesores, galga para juegos, galga palpadora
- go-no go gage: calibre máxima y mínimo, calibre de tolerancias
- height gage: escala de alturas
- planer gage: galga de cepilladora o de planeidad
- radius gage: plantilla de curvas de unión
- small hole gage: galga de interiores pequeños

MACHINE TRADES: Equipment and Tools

OFICIOS DE MECÁNICO: Equipo y Herramientas (Continuación)

telescoping gage: galga telescopiante para la medición de interiores

graduated scale: galga graduada de agujeros

grinders: máquina de afilar, de rectificar, afiladora, rectificadora

bench grinder: máquina de afilar de banco

carbide grinder: afiladora con cuchillas de carburo

hand grinder: amoladora basta de mano

surface grinder: rectificador de superficies planas (exteriores)

grinding wheels: muelas abrasivas (de afilar, de rectificar)

hacksaw: sierra de arco para metales

hammers: martillos, bicornios, martillos de forja, desbastadores, de mecánico, de pena, de pena blanda, de plisar, de remachar etcétera

hardness tester: durometro, medidor de durezas

hold-downs: cuña de sujección, de retenida, sujetador, de apriete, retenedor

hydraulic press: hidroprensa, prensa hidráulica

lathe, engine: torno de roscar, torno paralelo

measuring wire, thread and gear: galga de alambres comprobadora de engranes y de hilos de rosca

micrometers: micrómetros

anvil micrometer: micrómetro de yunque

depth micrometer: micrómetro para la verificación de profundidades

dial depth micrometer: micrómetro con cuadrante para la verificación de profundidades

external micrometer: micrómetro para medir exteriores o diámetros

MACHINE TRADES: Equipment and Tools

OFICIOS DE MECÁNICO: Equipo y Herramientas (Continuación)

internal micrometer: micrómetro para medidas interiores

thread micrometer: micrómetro para medir y verificar roscas

milling machine, horizontal: fresadora horizontal

milling machine, universal: fresadora universal

milling machine, vertical: fresadora vertical

parallels: galga de espesores, calibre de espesores

pliers: alicates

protractor: transportador

reamers: escariadores

scale: regla

screw drivers: desarmadores, desatornilladores

screw and top extractors: extractores de tornillos

scriber: punta de trazar, gramil

sine bar: goniómetro de precisión

slab mill: fresadora horizontal

stamps, numbering and lettering: troquel para numerar o para marcar con números y letras

steady rest: soporte fijo

straight edge: reglón, regla de trazar

straight edge: galga de planeidad

surface plate: tablero de trabajo basto

swivel vise: tornillo de banco de base pivotante

taper attachment: accesorio para tornear cónico

tapered sleeves: manguitos cónicos

MACHINE TRADES: Equipment and Tools

OFICIOS DE MECÁNICO: Equipo y Herramientas (Continuación)

tapping head: mandril portamachos

taps: machos (para roscar)

threading dies: cojinetes de roscar, dados de roscar

tool holder: portaherramientas

tool post: portacuchilla

transfer screws and punches: tornillos y punzones para transferir una serie de agujeros de una plancha o lámina a otra

universal head: cabezal universal

vernier caliper: calibre de nonio

vises: tornillos, tornos, prensas

workholding jaws: dispositivos para sujetar la pieza a trabajar, por ejemplo: el plato de tres garras

wrenches - llaves: inglesas, suecas, ajustables, de boca abierta, etcétera

MACHINE TRADES: Measuring Tools

OFICIOS DE MECÁNICO: Herramienta de Medición

bevel protractor with vernier: transportador-saltaregla, con calibre de nonio

calipers:

- hermaphrodite calipers: calibre hermáfrodita
- inside calipers: compás para interiores
- inside transfer calipers: compás para diámetros interiores
- outside calipers: compás de exteriores
- outside transfer calipers: calibre de diámetros exteriores
- vernier calipers; (reads .001): calibre de nonio, con graduaciones de .001 de pulgada

center gages: calibrador de centro, calibre de centro (rosca), plantilla para puntos, calibre para rectificar el ángulo de puntos

combination square with center and protractor heads: escuadra combinada con cabeza transportadora y contrapunta

dial indicator; .001 and .0001: indicadora de cuadrante para la medición de .001 y .0001 de pulgada

dividers: compás de dividir o de puntas secas

gage blocks: bloques calibradores

micrometers:

- depth micrometer: micrómetro de profundidades
- inside micrometer: micrómetro para diámetros interiores
- outside micrometer: micrómetro para diámetros exteriores
- thread micrometer: micrómetro para la medición de hilos de rosca; calibre para roscados internos
- vernier micrometer; (reads .0001): micrómetro de nonio con graduaciones de .0001 de pulgada

precision square: escuadra de precisión

MACHINE TRADES: Measuring Tools

OFICIOS DE MECÁNICO: Herramienta de Medición (Continuación)

protractor: transportador

scales; graduated in 64ths, 32nds, 16ths, 8ths, .10, 102, .01: reglas graduadas en 64 avos, 32 avos, 16 avos, octavos de pulgadas, y décimos, centésimos y milésimos de pulgada

sine bar: goniómetro de precisión, barra de senos

small hole gages: galga de interiores pequeños

surface gage: galga de planeidad

surface plate: tabla metálica

telescoping point: punta telescopiante

trammel points: compás de varas

vernier depth gage: galga indicadora de profundidades y de nonio

vernier height gage: galga indicadora de alturas y de nonio

wire standards; (used for pitch diameter - 3 wires): galga palpadora de hilos de rosca, o verificadores de diámetro efectivo

MACHINE TRADES TECHNICAL TERMS

ENGLISH-LAOTIAN LEXICON

CAREER DEVELOPMENT CENTER
SCHOOL OF TECHNICAL CAREERS
SOUTHERN ILLINOIS UNIVERSITY
CARBONDALE, ILLINOIS

MACHINE TRADES TECHNICAL TERMS

ENGLISH-LAOTIAN LEXICON

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MACHINE TRADES: General Terms

angle: ມຸມ

alloys: ໂລຫະ ປະສົມ.

bevel: ເຄື່ອງວັດແທກມຸມ

clamp: ເຄື່ອງມືຫຼາຍຊະນິດທີ່ໃຊ້ຈັບສິ່ງຂອງໂລຫະຕິດກັນ.

density (relative weight): ຄວາມໜາແໜ້ນຂອງວັດຖຸ.

file: ຕະໄບ

hone: ຫີນໂລໃຊ້ຫີນອ່ອນ ລະອຽດ.

machinability: ສາມາດກຶງໄດ້ດີ.

malleability: ຄວາມ ສາມາດ ເຄາະໃຫ້ເປັນຮູບຕ່າງໆ.

parallel: ຂນານ.

polish: ຂັດ.

smooth: ຂັດໃຫ້ລຽບ.

taper: ເຮັດໃຫ້ຄ່ອຍໆນ້ອຍລົງຂອງຄວາມໜາ ຫຼື ຄວາມກວ້າງ.

temper: ການເຮັດໃຫ້ໂລຫະມີຄວາມ ແຂງແກ່ນ ສະໝ່ຳສະເໝີ.

tensile: ສາມາດເຮັດໃຫ້ຍືດອອກໄດ້.

tensile strength: ກຳລັງຕ້ານທານ ການຍືດອອກຂອງໂລຫະ.

MACHINE TRADES: General Terms - (cont.)

truing: ເຮັດໃຫ້ທ່ຽງ ຫຼືດທ່ຽງການຂະໜາດ.

wedge: ສ່ວນທີ່ ປແນງເຂັດ ດ້ວຍໄມ້ ຫຼື ເຫຼັກ ມີຮູບປ່າງແຫຼມ ໃຊ້ຕຳ ລື້ໃຫ້ກວ້າງ ຫຼືຂະຫຍາຍ ຂອບຮອງຮອງ ຫັ້ງຮອງ ທີ່ຫ່າມີຮູ ຍາວ ໂດຍການຕ່ອຍໂຕຕອກ (ຫລິ່ມ).

MACHINE TRADES: Grinding Terms

abrasive: ສິ່ງທີ່ໃຊ້ສໍາລັບ ຝົນ, ຂັດ ແລະ ຖູ.

accuracy: ແມ່ນຍໍາ.

alumina: ຜົງອະລູມີນຽມ

aluminum oxide: ຜົງອະລູມີນຽມ ທີ່ຍຶດຕິດກັນ ໃຊ້ສໍາລັບ ຝົນຂັດ ແລະ ຖູ.

Alundum: ເປັນຊື່ການຄ້າ ຂອງບໍລິສັດ Norton ສໍາລັບ ຜົງອະລູມີນຽມ ທີ່ຍຶດ
ຕິດກັນ.

arbor: ແກ່ນໝູນຂອງເຄື່ອງຝົນ
ຊຶ່ງທີ່ເອົາໃສ່ລູກລໍ້.

arbor hole: ຮູຂອງລໍ້ ໃຊ້ສໍາລັບຝົນ ມີຂະໜາດໃສ່ເຂົ້າກັບ ແກ່ນໝູນຂອງເຄື່ອງ

arc of contact: ສ່ວນໂຄ້ງຂອງລໍ້ທີ່ໃຊ້ຝົນ ເປັນເສັ້ນວົງກົມ ສໍາລັບຝົນ
ທີ່ຕ້ອງການຝົນ ພຽງແຕ່ໃຫ້ມັນແຕະເທົ່ານັ້ນ.

area of contact: ພື້ນທີ່ລໍ້ຝົນເຂົ້າຫາ.

Bauxite: ແຮ່ທີ່ມີຜົງອະລູມີນຽມຢູ່ ນຳໃຊ້ເຮັດໂຕຝົນ Alundum.

bearing: ລູກປືນ.

bench stand: ບ່ອນຕັ້ງເຄື່ອງທີ່ມີເຄື່ອງຝົນຕິດຢູ່ກັບທີ່.

blotter: ກະດາດຊຶບ

bond: ບ່ອນນໍ້າຢາທີ່ເຮັດໃຫ້ສ່ວນແລະສ່ວນຂອງຕົວຝົນຕິດກັນກັບລໍ້ຝົນ.

Boron Carbide: ເປັນເຫຼັກທີ່ແຂງທີ່ສຸດ. ທີ່ມີຂາຍໃນຕະຫຼາດ.

burning (the work): ການປ່ຽນສີ ເນື່ອງຈາກເກີດຄວາມຮ້ອນເກີນໄປ.

MACHINE TRADES: Grinding Terms - (cont.)

bushing: ປອກສວມ (ສຸບ) ສ່ວນຫຼາຍ ເປັນທະກົ່ວ ຫຼື ທອງເຫລືອງ ບາງທີ່ ເປັນອະລູມີນຽມ.

center-hole lapping: ການຂູໃຫ້ລຽບຂອງຮູກົມໆ.

centerless grinding: ການຝົນຂ້າງໃນ ຫຼື ຂ້າງນອກ ຂອງທີ່ກົມໆ.

centers: ຈຸດສູນກາງ.

chatter marks: ການຝົນທີ່ເຮັດໃຫ້ເນື້ອຂ້າງໜ້າບໍ່ລະອຽດ ພໍ້ສົງ.

chuck: ຂົນຈັບລໍ້ສໍາລັບຝົນ.

coated abrasives: ຊ້ຽທີ່ເຄືອບດ້ວຍວັດຖຸສໍາລັບຂັດ.

coolant: ສ່ວນປະສົມເປັນນໍ້າ ທີ່ເຮັດໃຫ້ວຽກາເຢັນ ແລະບໍ່ເປັນຂີ້ໝ້ຽງ.

corner wear: ລໍ້ຫີນທີ່ໃຊ້ຝົນຈະຫລຸ້ຍບ່ອນມຸມຂ້າງໆຂອງວົງລໍ້.

corundum: ວັດຖຸສໍາລັບຂັດ ຂອງ Aluminuum oxide.

crush dressing: ການໃຊ້ມວນເຫຼັກສໍາລັບແຕ່ງວົງລໍ້ທີ່ໃຊ້ຝົນເປັນຮູບຕ່າງໆ.

cutting-off wheel: ລໍ້ຝົນຊະນິດສໍາລັບຕັດ.

cutting surface: ແຜ່ນດ້ານໜ້າຂອງລໍ້ຝົນ ສໍາລັບຝົນ ບ່ອນທີ່ຖືກຝົນ

cylindrical grinding: ການຝົນດ້ານນອກຂອງແທ່ງກົມໆ

diamond tool: ເຄື່ອງມືສໍາລັບແຕ່ງເຄື່ອງຝົນທີ່ມີກາກາເພັດປະສົມ.

diamond wheel: ລໍ້ສໍາລັບຝົນທີ່ມີກາກາເພັດປະສົມຢູ່.

MACHINE TRADES: Grinding Terms - (cont.)

discoloration: ການປ່ຽນສີເກີດຈາກຄວາມຮ້ອນ.

dog: ເຄື່ອງຈັບວຽກໃຫ້ໝູນໄປນຳກັນ.

dressers: ເຄື່ອງມືສຳລັບແຕ່ງວົງລໍ້ສຳລັບຝົນ.

dressing: ການປ່ຽນຮູບຮ່າງຂອງວົງລໍ້ສຳລັບຂັດ.

ductile: ດັດແປງໃຫ້ເຂົ້າກັບຮູບອື່ນໆໄດ້.

emery: ວັດຖຸປະສົມຂອງ Aluminum oxide ສຳລັບຂັດຖູ.

external grinding: ການຝົນຂ້າງນອກຂອງວຽກ.

face: ການຝົນດ້ານໜ້າຂອງວົງລໍ້.

feed-cross: ໃນການຝົນດ້ານໜ້າ ການເລື່ອນໄປມາຂະໜານກັບພື້ນ.
ຂອງວົງລໍ້.

feed-down: ຣະຍະເວລາທີ່ວົງລໍ້ຝົນແຕ້ມຄ່ອຍໆເຂົ້າໄປຫາວົງລໍ້.

finish: ຄຸນນະພາບຂອງເນື້ອດ້ານໜ້າຂອງວຽກ.

finishing: ການຝົນເທື່ອສຸດທ້າຍຂອງວົງລໍ້ຝົນ.

floor-stand grinders: ບ່ອນຕັ້ງກັບພື້ນຂອງເຄື່ອງຝົນ.

freehand grinding: ການຝົນໂດຍໃຊ້ເຄື່ອງຝົນຊະນິດມືຖືໄດ້.

generated heat: ຄວາມຮ້ອນເກີດຈາກການຝົນ.

glazing: ຮອຍດ່ຽງເກີດຄວາມມົວຂອງການຝົນ.

MACHINE TRADES: Grinding Terms - (cont.)

grade: ຄວາມໜ້າແໜ້ນ ຫຼື ແຂງ ຂອງວົງລໍ້ຝົນ.

grain: ຄວາມລະອຽດ ຫຼື ຂະໜາດ ຂອງວັດຖຸທີ່ທຳໜ້າທີ່ຝົນ.

grain size: ຂະໜາດຂອງວັດຖຸທີ່ໃຊ້ຝົນ.

grain spacing: ການຢາຍວັດຖຸທີ່ໃຊ້ຝົນ

grinding: ການຝົນໂດຍໃຊ້ວົງລໍ້.

grinding action: ຄວາມສາມາດຂອງການຝົນ.

grinding machines: ເຄື່ອງມືຊະນິດຕ່າງໆ ທີ່ໃຊ້ລໍ້ຝົນ.

grinding wheel: ລໍ້ຝົນທີ່ມີສ່ວນປະສົມຂອງວັດຖຸ ສຳລັບຂັດວັດຖຸ.

honing: ການຝົນທາງໃນຜິວໜ້າຂອງວົງກົມ.

hoods: ເຄື່ອງປ້ອງກັນແຕກ ຂອງວົງລໍ້ຝົນ.

Huntington Dresser: ເຄື່ອງຕົບແຕ່ງວົງລໍ້ຝົນ ຕິອຊື່ນ ຈາກ ທ່ານ Huntington.

internal grinding: ການຝົນສ່ວນຂ້າງໃນຂອງຮູ.

lapping: ການຝົນເທື່ອສຸດທ້າຍ.

loading: ຜົງເຫຼັກຕິດກັບວົງລໍ້ຝົນເຮັດໃຫ້ລໍ້ຝົນບໍ່ຄ່ອຍດີ.

lubricant: ນ້ຳຢາສຳລັບຫລໍ່ລື່ນກັບຊ່ວຍໃຫ້ຕັດໂລຫະໄດ້ດີຂຶ້ນ.

mounting: ການໃຊ້ວົງລໍ້ຝົນເຂົ້າໃນເຄື່ອງຝົນ.

MACHINES TRADES: Grinding Terms - (cont.)

natural abrasive: ວັດຖຸ ສໍາລັບ ຝົນ ເກີດ ຈາກ ທໍາມະຊາດ.

off-grade: ວັດຖຸ ສໍາລັບ ຝົນ ບໍ່ເຖິງຂັ້ນ.

offhand grinding: ການ ຝົນ ໂດຍ ໃຊ້ ມື ຖື ເຄື່ອງ ຝົນ.

oilstone: ຫີນ ຝົນ ທີ່ ມີ ນໍ້າ ມັນ ຢູ່ ໃນ ຫີນ.

operating speed: ຄວາມໄວຂອງເຄື່ອງຝົນ ເປັນ ຮອບ ຕໍ່ ນາທີ.

organic bond: ສິ່ງ ຈະ ເປັນ ຕົວ ຍຶດ ຂອງ ວັດຖຸ ສໍາລັບ ຖູ.

peripheral speed: ຄວາມໄວ ຂອງ ເສັ້ນ ຮອບ ຂອງ ວົງລໍ້.

periphery: ເສັ້ນ ຮອບ ວົງກົມ ຂອງ ວົງລໍ້.

precision work: ງານ ຊະນິດ ລະອຽດ ແລະ ທ່ຽງຕົງ.

production: ຈໍານວນ ວຽກ ທີ່ ເຮັດ ເປັນ ອັນ ໃນ ລະຍະ ຊີວິດ ຂອງ ວົງລໍ້.

recessed wheels: ວົງລໍ້ ຝົນ ຊະນິດ ທີ່ ດ້ານ ຂ້າງ ຍຸບ ລົງ ຈັກ ໜ່ອຍ.

resinoid bond: ຊື່ ຂອງ ຢາງສົນ ໃຊ້ ສໍາລັບ ສິ່ງ ຂອງ ໃຫ້ ຕິດ ກັນ.

Rockwell Hardness Tester: ເຄື່ອງ ມື ທົດ ສອບ ຄວາມ ແຂງ ຂອງ ເຫຼັກ.

roll-grinding machine: ເຄື່ອງ ມື ຝົນ ແທ່ງ ເຫຼັກ ກົມ ໆ.

rough grinding: ການ ຝົນ ເທື່ອ ທໍາ ອິດ.

r.p.m.: ຫຍໍ້ ມາ ຈາກ revolutions per minute "ຮອບຕໍ່ນາທີ"

MACHINE TRADES: Grinding Terms - (cont.)

rubber bond: ມັນເປັນທີ່ມີສ່ວນປະກອບຂອງຢາງໄມ້ ໃຊ້ເຮັດກາວ.

rubber wheels: ລໍ້ຢາງ

safety devices: ເຄື່ອງປ້ອງກັນຄົນຈັກ ເຄື່ອງຈາກອຸປະຕິເຫດ.

scale: ເປັນເກັດສີດຳໆ ເຄືອບຕິດຢູ່ກັນກັບເຫຼັກ ທີ່ຖືກຄວາມຮ້ອນສູງ-

scratches: ຮອຍເປັນເສັ້ນ ເກີດຈາກນ້ຳຢາລະບາຍຄວາມຮ້ອນ ມັນເປື້ອນ.

s.f.p.m.: ລະຍະທາງເປັນຟຸດທີ່ມາທັ້ ຮອບໆ ວຸງກ.

sharpening stone: ເຄື່ອງຝົນ ເຄື່ອງມື ເຮັດຈາກຫີນ.

shellac bond: ກາວປະສົມຈາກຄັ່ງ.

silicate bond: ກາວຈາກສ່ວນປະສົມຫີນ.

silicon carbide: ວັດຖຸສໍາລັບຖູ ເຮັດຈາກຝຸ່ນຫີນ ແລະສ່ວນປະສົມຂອງ ຫີນ Norton Crystolon (SiC).

straight wheel: ຈົງລໍ້ຝົນຊະນິດສອງຂ້າງພຽງກັນ.

structure: ຄໍາອະທິບາຍສ່ວນປະສົມ ແລະການຄັດວັດຖຸຝົນ ແລະກາວຢ່າງໃດ.

structure number: ຕົວເລກຂອງວັດຖຸຝົນ ສໍາລັບບອກຄວາມລະອຽດຂອງ ການຝົນ.

surface grinding: ການຝົນດ້ານໜ້າໃຫ້ພຽງ.

surface-grinding machine: ເຄື່ອງຝົນຜິວໜ້າໃຫ້ພຽງ.

table: ໂຕະສໍາລັບຕັ້ງເຄື່ອງຝົນ.

MACHINE TRADES: Grinding Terms - (cont.)

table traverse: ໂຕ໊ະ ທີ່ເຄື່ອນທີ່ໄປມາໄດ້ ຂອງເຄື່ອງຝົນ.

tapered wheel: ວົງລໍ້ ຝົນ ຈະມີດບາງຕອນປາຍ.

temper: ການເຮັດໃຫ້ໂລຫະແຂງ ໂດຍໃຊ້ຄວາມຮ້ອນ.

tensile strength: ແຮງຕ້ານທານ ແຮງດຶງຂອງໂລຫະ.

treatment: ການໃຊ້ວັດຖຸບາງຢ່າງ ປະສົມກັບວັດຖຸສໍາລັບຖູ ເຮັດໃຫ້ຝົນໄດ້ຜົນ ກັບເຟີເຫຼັກບໍ່ຕິດກັບວົງລໍ້ຝົນ.

truing: ການເຮັດໃຫ້ ວົງລໍ້ຝົນທ່ຽງຕົງ ແລະ ກົມ

vitrified bond: ກາວປະສົມ ກັບດິນແດງ.

wheel speed: ຄວາມໄວຂອງລໍ້ຝົນ.

wheel traverse: ການເຄື່ອນທີ່ຂອງວົງລໍ້ຝົນ ຊ້າຍໄປຊ້າຍມາ.

work: ວຽກ.

work speed: ຄວາມໄວຂອງວຽກ.

MACHINE TRADES: Lathe Parts - Names and Functions

apron: ບ່ອນຈັບ ແລະ ຄວບຄຸມໃບມີດ ສຳລັບກຶງ.

apron handwheel: ວົງລໍ້ ສຳລັບເລື່ອນ ບ່ອນຈັບໃບມີດໄປມາ.

back gear: ການລົດຄວາມໄວ ໂດຍໃຊ້ເກັ້ງຫລັງ.

back gear lever: ທີ່ໝູນເກັ້ງຫລັງ.

bed: ຖານເຄື່ອງກຶງ

belt tension lever: ຄັນ ໝູນເຮັດໃຫ້ສາຍພານເຄັ່ງ.

clutch knob or lever: ຄັນ ຄລິຊ.

compound rest: ໃຊ້ສຳລັບຕັດໝູນ.

cone pulley: ໃຊ້ສຳລັບເລືອກຄວາມໄວຫຼືຊ້າ.

cross feed knob: ເລື່ອນໄປມາ ສຳລັບກຶງ ດ້ານໜ້າ

dog plate: ໃຊ້ສຳລັບໝູນວຽກ (ເປັນແຜ່ນ).

feed reverse lever: ປ່ຽນທິດທາງຂອງການໝູນ.

feed selector lever: ຄັນ ໝູນສາມໜ້າທີ່ໄປມາເຂົ້າອອກ

half nut lever: ໃຊ້ສຳລັບເຮັດກຽວ.

head stock bearing: ລູກປືນຂອງ head stock.

head stock spindle: ເຄື່ອງຈັບວຽກທຸກຢ່າງ ຈັບຕິດກັບຄັນໝູນ.

MACHINE TRADES: Lathe Parts - Names and Functions (cont.)

lead screw: ໃຊ້ສຳລັບເຮັດກຽວເທົ່ານັ້ນ.

legs: ຂາຂອງເຄື່ອງກຶງ.

quick change gear box: ໃຊ້ສຳລັບເລືອກຄວາມໄວຂອງເຄື່ອງກຶງ.

rack: ສ່ວນທີ່ຊ່ວຍໃຫ້ອານຂອງເຄື່ອງກຶງເລື່ອນໄປມາໄດ້ ດ້ວຍມືຫຼືກຳລັ
ຈາກເຄື່ອງ.

saddle: ອານຂອງເຄື່ອງກຶງ.

sliding gear: ໃຊ້ສຳລັບເຮັດກຽວ.

tail stock: ບ່ອນຈັບວຽກ ຕັ້ງຂ້າມກັບ Head Stock.

tail stock binding lever: ໃຫ້ເບິ່ງ "tail stock spindle"

tail stock handwheel: ວົງລໍ້ໝູນສຳລັບຕັ້ງແທ່ນຂວານ.

tail stock spindle: ໃຊ້ສຳລັບຈັບ ວຽກ.

threading dial indicator: ໃຊ້ສຳລັບເຮັດກຽວເທົ່ານັ້ນ.

tool post: ບ່ອນຈັບໃບມີດສຳລັບກຶງ.

top lever: ໃຊ້ສຳລັບເລືອກກຽວ.

tumbler lever: ໃຊ້ສຳລັບເລືອກກຽວ.

ways: ຮັກສາລະດັບແທ່ນໃຫ້ຢູ່ໃນເສັ້ນອັນດຽວກັນ.

MACHINE TRADES: Lathe - Screw-Thread Terms

angle of thread: ມຸມຂອງກຽວ.

axis of a screw: ເສັ້ນແກ່ນຂນານຂອງສະກູ.

crest: ສ່ວນສູງຂອງດ້ານສອງຂ້າງຂອງກຽວ.

depth of engagement: ຄວາມເລິກຂອງກຽວຕິດກັນ.

depth of thread: ຄວາມເລິກຂອງກຽວ.

external thread: ກຽວທີ່ຂ້າງນອກ.

half angle: ມຸມລະຫວ່າງຂ້າງສອງຂ້າງຂອງກຽວ.

helix angle: ມຸມເກີດຂຶ້ນຈາກວົງຂອງກຽວ.

internal thread: ກຽວຂ້າງໃນ.

lead: ລະຍະທາງທີ່ກຽວໝູນນຶ່ງຮອບ.

length of engagement: ລະຍະທາງທີ່ຂອງສອງອັນກັບກັນ.

major diameter: ເສັ້ນຜ່າສູນກາງທີ່ໃຫຍ່ທີ່ສຸດຂອງກຽວ.

minor diameter: ເສັ້ນຜ່າສູນກາງທີ່ນ້ອຍທີ່ສຸດຂອງກຽວ.

pitch: ລະຍະລະຫວ່າງສອງກຽວ

pitch diameter: ເສັ້ນຜ່າສູນກາງຂອງ Pitch.

root: ສ່ວນລຸ່ມຂອງກຽວ.

MACHINE TRADES: Lathe - Screw-Thread Terms (cont.)

screw thread: ກຽວຂອງສະກູກຽວ.

side: ດ້ານຂ້າງຂອງກຽວ ທີ່ຕິດຕໍ່ ສ່ວນສູງກັບ ສ່ວນລຸ່ມ ຂອງກຽວ.

thickness of thread: ຄວາມໜາ ຂອງກຽວ.

MACHINE TRADES: Milling-Machine Parts- Names and Functions

adjustable arm braces: ບ່ອນຊ່ວຍຈັບໃຫ້ແຂນທີ່ເລື່ອນໄປມາໄດ້ ມີຄວາມແຂງແຮງຂື້ນ.

coolant distributor: ຫົວສີດຂອງນ້ຳຢາ ເຮັດໃຫ້ວຽກເຢັນລົງ.

coolant-pump switch: ບ່ອນເປີດປິດເຄື່ອງສູບນ້ຳຢາ ສຳລັບສີດນ້ຳຢາເຮັດໃຫ້ວຽກເຢັນ.

electrical-control compartment: ປຸ່ມຄວບຄຸມທີ່ໃຊ້ກຳລັງໄຟຟ້າ

feed and fast-travel motor: ໝໍ້ໄຟ ສຳລັບໝູນເຄື່ອງ.

feed-selector lever and dial: ການໝູນ ສຳລັບປຸ່ມ ຄວາມໄວ.

inner arbor yoke: ບ່ອນຈັບທາງໃນຂອງການໝູນ.

knee-clamp lever: ການຈັບຂອງເຂົ່າ.

longitudinal adjustment handcrank: ເຄື່ອງມື ສຳລັບໝູນຖານເຄື່ອງທາງຍາວໄປມາ.

longitudinal feed-control lever: ກ້ານສຳລັບ ຄວບຄຸມການເລື່ອນທາງຍາວເຂົ້າອອກ.

machine start-stop lever: ກ້ານ ສຳລັບ ເດີນ ແລະ ຢຸດ ເຄື່ອງ.

main-disconnect switch: ບ່ອນປິດເປີດກະແສໄຟຂອງເຄື່ອງ.

motor-driven centrifugal coolant pump: ປັ້ມນ້ຳທີ່ໃຊ້ໄຟຟ້າ ສຳລັບສີດນ້ຳຢ
ໃຫ້ວຽກເຢັນ.

outer arbor yoke: ບ່ອນຈັບຂ້າງນອກຂອງການໝູນ.

overarm-clamp lever: ກໍ້ຈັບຂອງ Overarms.

overarms: ໃຊ້ສຳລັບຕັ້ງບ່ອນຈັບທີ່ໝູນຂ້າງນອກແລະຂ້າງໃນໄດ້.

MACHINE TRADES: Milling Machine Parts - (cont.)

power fast-travel lever: ການສຳລັບຄວບຄຸມກຳລັງເດີນຂອງເຄື່ອງ.

saddle-clamp lever: ການຈັບທຽກຢູ່ເທິງຖານເຄື່ອງ.

speed-selector lever and dial: ການຄຸມຄວາມໄວຂອງເຄື່ອງ.

spindle-jog button: ປຸ່ມສຳລັບກົດກູ້ຫາກວ່າເຄື່ອງເກີດຕິດຂັດ.

spindle motor: ໝໍ້ໝູນເຄື່ອງ ສຳລັບໝູນແກນ.

spindle-motor reversing switch: ບ່ອນເຮັດໃຫ້ແກນໝູນກັບໄປກັບມາ.

table-clamp lever: ບ່ອນຈັບຖານແຫຼັກຂອງເຄື່ອງ.

table-swivel clamp screw (at front) and clamp nut (under saddle): ນ໊ອດຕົວຜູ້. ສຳລັບຈັບຖານຂອງເຄື່ອງ.

transverse-adjustment handwheel: ວົງລໍ້ໝູນມື ສຳລັບເລື່ອນທຽກທາງຂວາງ.

transverse-feed-control lever: ການຄວບຄຸມການເລື່ອນທາງຂວາງຂອງທຽກ.

universal spiral-index center footstock: ຖານແຫຼັກສຳລັບຈັບທຽກທີ່ສາມາດຕັ້ງໄດ້ອ່ຽງຫ່ຽງຕົງ.

universal spiral-index center headstock: ວົງລໍ້ສຳລັບໝູນໃຫ້ເລື່ອນຂຶ້ນ-ລົງ.

vertical adjustment handwheel: ການຄວບຄຸມການເລື່ອນເຂົ້າຂອງແກນໝູນ.

vertical-feed-control lever: ການຄວບຄຸມການເລື່ອນຄ່ອຍໆເຂົ້າຂອງແກນໝູນ.

MACHINE TRADES: Milling Operation Terms

angular milling: ການຊາກໂລຫະຂອງວຽກ ເຂົ້າຫາຕົວຊາກ ເປັນມຸມ.

face milling: ການຊາກ ດ້ານໜ້າຂອງວຽກໃຫ້ພຽງ.

form milling: ການຊາກໂລຫະ ທີ່ມີຮູບຮ່າງຊະນິດຕ່າງໆ.

gang milling: ການໃຊ້ຫົວຊາກຫລາຍອັນ.

milling flutes: ການເຈາະຮູເປັນເສັ້ນທາງຍາວ. ໂດຍໃຊ້ເຄື່ອງຊາກ.

plain milling or **slab milling**: ການຊາກໂລຫະ ໃຫ້ເຮືອງໜ້າພຽງກັນ.

straddle milling: ການຊານວຽກສອງຂ້າງໃນເວລາດຽວກັນ.

MACHINE TRADES: Properties of Metal Terms

brittleness: ຄວາມເປາະ ຂອງໂລຫະ.

ductility: ຄວາມອ່ອນ ຂອງໂລຫະ.

hardness: ຄວາມແຂງ ຂອງໂລຫະ.

strength: ຄວາມແຂງແຮງ ຂອງໂລຫະ

toughness: ຄວາມທົນທານ ຂອງໂລຫະ

MACHINE TRADES: Equipment and Tools

1. angle plate: ແຜ່ນເຫຼັກເປັນທີ່ຕິດຢູ່ກັບວຽກຄືໝູນຂວງຫົວກໍ່.

2. arbor: ແທ່ງໝູນຂອງເຄື່ອງ ເປັນບ່ອນຈັບຂອງລູກລໍ້.

3. arbor press: ແຜ່ນເຫຼັກສໍາລັບກົດໃຫ້ວຽກຢູ່ກັບບ່ອນ.

4. bandsaws: ເລື່ອຍເປັນແຜ່ນບາງໆ.
   contour bandsaw: ເລື່ອຍເສັ້ນຍາວ ສໍາລັບຕັດຊອຍໆ
   horizontal cutoff bandsaw: ສໍາລັບຕັດສລຽງ.
   vertical cutoff bandsaw: ສໍາລັບຕັດຕົງ.

5. blocks: ກ້ອນເຫຼັກ.
   gage blocks: ກ້ອນເຫຼັກ ສໍາລັບວັດ ຄວາມກວ້າງ ຄວາມໜາ
   set-up blocks: ກ້ອນເຫຼັກ ສໍາລັບຕິດຕັ້ງ.
   v-blocks: ກ້ອນເຫຼັກ ສໍາລັບວັດວຽກໃຫ້ຕົງ.

6. boring bar holder: ບ່ອນຈັບແກ່ນເຫຼັກສໍາລັບກໍ່.

7. boring head: ຫົວຊາກເຮັດໃຫ້ຮູຂຍາຍກວ້າງຂື້ນ.

8. boring mill, universal: ເຄື່ອງເຈາະຈະມີດໄຊ້ຫົວຊາກ.

9. boring tool: ເຄື່ອງມືສໍາລັບເຈາະຮູ.

10. calipers: ເຄື່ອງມືວັດແທກຄວາມໜາຢ່າງລະອຽດ.

11. carriage stop: ສິ່ງທີ່ເຮັດໃຫ້ຂອງທີ່ເລື່ອນໄດ້ຢຸດ.

12. center drills: ຈຸດສູນກາງເຈາະກ່ອນຈະສະວ່ານ.

13. center punches: ເຄື່ອງເຈາະຮູທີ່ມີປາຍແຫຼມ ໃຊ້ຄ້ອນທອກເອົາ.

MACHINE TRADES: Equipment and Tools - (cont.)

14. chisels: ສິ່ວ.

15. chucks: ບ່ອນຈັບວຽກຂອງເຄື່ອງກຶງ.
    key-type chucks: ບ່ອນຈັບສະວ່ານຊະນິດໃຊ້ກະແຈໝູນໃຫ້ແໜ້ນ.
    magnetic chucks: ຊະນິດໃຊ້ແມ່ເຫຼັກຈັບໃຫ້ແໜ້ນ.
    quick change chucks: ຊະນິດກົດເຂົ້າ-ອອກ ຢ່າງໄວ.

16. Clamps: ອັນຈັບເຫຼັກຕ່າງໆ.

17. clamps and straps: ອັນຈັບເຫຼັກ ແບບເປັນເສັ້ນ.

18. collet: ບ່ອນຈັບທ່ອນເຫຼັກ ໃຊ້ສຳລັບຈັບວຽກທີ່ລະອຽດ.

19. combination squares: ເຄື່ອງວັດແຈສາກມຸມ ຫຼາຍຢ່າງ.

20. counterbore: ການເຈາະຮູທີ່ໃຫຍ່ກ່ວາຮູເລກ ແຕ່ບໍ່ຊອດ.

21. countersink: ການເຈາະຮູເທື່ອທີສອງ ເຮັດໃຫ້ບານປາຍ ມີຮູບກວ

22. cutters: ໃບມີດສຳລັບກຶງ.
    deburring tools: ເຄື່ອງມືສຳລັບຝົນຂອບໃຫ້ມົນ.
    flycutters: ໃບມີດສຳລັບເຈາະຮູກົມໆໃຫ້ໃຫຍ່ຂຶ້ນ ແຕ່ບໍ່ຊອດ.
    milling cutters: ໃບມີດສຳລັບຖາກໄສ.
    slab cutters: ເຄື່ອງມືຕັດແຜ່ນເຫຼັກໜາ.
    T-slot cutters: ໃບມີດຕັດ ສຳລັບເຈາະຮູໃຫ້ເປັນຮູບຕົວທີ(T)

23. dial caliper: ເຄື່ອງວັດຄວາມໜາຢ່າງລະອຽດ.

24. dial indicators: ເຄື່ອງວັດ ຊີ້ທີ່ຫລວມ.

25. diamond dresser: ເຄື່ອງແຕ່ງວັດຖຸສຳລັບຖູຫີນ ມີກາກເພັດປະສົມ.

MACHINE TRADES: Equipment and Tools - (cont.)

26. dil stone: ຫີນຝົນ.

27. dividers: ວົງກົມ ສໍາລັບຂີດ ແລະແບ່ງໃຫ້ເທົ່າກັນ.

28. dog: ເຄື່ອງຈັບວຽກໃຫ້ໝູນໄປນໍາກັນ.

29. drift pins: ການຕີ້ ຫົວຕະປູໃຫ້ລຸບລົງ.

30. drills: ຫົວສະວ່ານ.

31. drill press, floor type: ເຄື່ອງເຈາະສະວ່ານ ແບບຕັ້ງເທິງຖານເຫຼັກ ຕິດກັບພື້ນ.

32. drill press, radial: ເຄື່ອງເຈາະສະວ່ານ ຊະນິດເລື່ອນໄປມາໄດ້ຫຼາຍທິດ.

33. drive pin punches: ເຫຼັກຕອກຕິ່ງ.

34. edge finder: ເຄື່ອງຫາຂອບມຸມ.

35. electric furnace: ເຄື່ອງເຮັດຄວາມຮ້ອນຈາກກະແສໄຟຟ້າ.

36. emery cloth: ກະດາດຊາຍທີ່ໃຊ້ຂັດຖູ ຊະນິດປຽກນໍ້າໄດ້.

37. end mill: ການຖາກໂລຫະອອກ ທາງຂ້າງຂອງວຽກ.

38. face plate: ທີ່ຈັບວຽກ.

39. face mill: ການຖາກໂລຫະອອກທາງດ້ານໜ້າ.

40. files: ຕະໄບ.

41. filing machine: ເຄື່ອງມືສໍາລັບຕະໄບ.

42. fixtures: ເຄື່ອງມື ເຄື່ອງໃຊ້ ຫຼາຍໆແນວ.

MACHINE TRADES: Equipment and Tools - (cont.)

43. fixtures scale: ເຄື່ອງວັດນ້ຳໜັກ.

44. gages: ເຄື່ອງວັດແທກຄວາມໜາ.
    feeler gage: ແຜ່ນວັດແທກຄວາມໜາບາງໆ.
    go-no go gage: ແຜ່ນວັດແທກຄວາມໜາແບບໄດ້ງ່າຍ.
    height gage: ເຄື່ອງວັດແທກຄວາມສູງ.
    height setting gage: ເຄື່ອງມືຕັ້ງຄວາມສູງ.
    planer gage: ເຄື່ອງມືວັດພື້ນພຽງ.
    radius gage: ເຄື່ອງມືວັດແທກຣັສມີ.
    small hole gage: ເຄື່ອງມືວັດແທກຮູນ້ອຍໆ.
    telescoping gage: ເຄື່ອງວັດແທກທີ່ໃຊ້ທ່ອງຂະຫຍາຍອອກ.

45. graduated scale: ເຄື່ອງມືວັດແທກສ່ວນທີ່ເປັນຂັ້ນໆ ຈາກນ້ອຍໄປຫາໃຫຍ່.

46. grinders: ເຄື່ອງຝົນ.
    bench grinder: ເຄື່ອງຝົນຊະນິດຕິດກັບໂຕະ.
    carbide grinder: ເຄື່ອງຝົນເຫຼັກແຂງ.
    hand grinder: ເຄື່ອງຝົນທີ່ໃຊ້ມືຈັບ.
    surface grinder: ເຄື່ອງຝົນແຜ່ນໜ້າຂອງວຽກ.

47. grinding wheels: ວົງລໍ້ຝົນ.

48. hacksaw: ເລື່ອຍ

49. hammers: ຄ້ອນ.

50. hardness tester: ເຄື່ອງວັດຄວາມແຂງຂອງເຫຼັກ.

51. hold-downs: ທີ່ກົດຈັບວຽກ.

MACHINE TRADES: Equipment and Tools - (cont.)

52. hydraulic press: ເຄື່ອງກົດທີ່ໃຊ້ແຮງຈາກ Hydraulic.

53. lathe, engine: ເຄື່ອງກຶງ.

54. measuring wire, thread and gear: ລວດວັດແທກຂະໜາດຂອງກຽວ-ເກັຽ

55. micrometers: ເຄື່ອງວັດແທກທີ່ລະອຽດ.

anvil micrometer: ວັດແທກຄວາມກົດລົງຂອງໂລຫະ.

depth micrometer: ວັດແທກຄວາມເລິກ.

dial depth micrometer: ວັດແທກຄວາມເລິກແບບອ່ານຄາກໃນ

external micrometer: ວັດແທກຂ້າງນອກ.

internal micrometer: ວັດແທກຂ້າງໃນ.

thread micrometer: ວັດແທກກຽວ.

56. milling machine, horizontal: ເຄື່ອງຊູາກໂລຫະແບບນອນ.

57. milling machine, universal: ເຄື່ອງຊູາກໂລຫະແບບໃຊ້ທົ່ວໄປ.

58. milling machine, vertical: ເຄື່ອງຊູາກໂລຫະແບບຕັ້ງຕົງ

59. parallels: ເຄື່ອງວັດໃຫ້ຂະໜານ.

60. pliers: ຄີມ.

61. protractor: ເຄື່ອງວັດມຸມ.

62. reamers: ເຄື່ອງມືຂະຫຍາຍຮູໃຫ້ກວ້າງ.

63. scale: ເຄື່ອງວັດນ້ຳໜັກ.

64. screw drivers: ໄຂຄວງ.

MACHINE TRADES: Equipment and Tools - (cont.)

65. screw and top extractors: ເຄື່ອງຖອນຕະປູ່ກຽວ.

66. scriber: ເຄື່ອງຂີດເສັ້ນ.

67. sine bar: ເຄື່ອງວັດຄວາມເລິກ ໂດຍໃຊ້ມຸມ.

68. slab mill: ການຕັດໂລຫະ ຈາກແຜ່ນໂລຫະໜາ.

69. stamps, numbering and lettering: ການຕີຕົວໜັງສືໃສ່ໂລຫະ.

70. steady rest: ຕັ້ງຢູ່ກັບບ່ອນ.

71. straight edge: ໄມ້ຂີດເສັ້ນຕົງ

72. straight edge: ໄມ້ຂີດເສັ້ນຕົງ.

73. surface plate: ອັນຈັບວຽກເປັນແຜ່ນແລະກົມ

74. swivel vise: ເຄື່ອງມືຈັບມີດ ຈະ: ມີດອຽງໄດ້.

75. taper attachment: ເຄື່ອງປະກອບສຳລັບວັດແທກຄວາມໜາທີ່ບໍ່ເທົ່າກັນ.

76. tapered sleeves: ປອກເຫຼັກທີ່ມີຄວາມໜາບໍ່ເທົ່າກັນ.

77. tapping head: ເຄື່ອງມືສຳລັບເຮັດກຽວຂ້າງໃນ.

78. taps: ເຄື່ອງມືເຮັດກຽວຂ້າງໃນ.

79. threading dies: ເຄື່ອງມືເຮັດກຽວຂ້າງນອກ.

80. tool holder: ອັນຈັບເຄື່ອງມື (ມີດ).

MACHINE TRADES: Equipment and Tools - (cont.)

81. tool post: ເສົາບ່ອນຈັບຂອງເຄື່ອງມື.

82. transfer screws and punches: ເຫຼັກຕັ້ແປ້ນແຂ້ງ.

83. universal head: ຕະ:ປູຄວງ ຊະ:ນິດມີຫົວ ສຳລັບໃຊ້ກັບໃສຂອງຫຼາຍຢ່າງ.

84. vernier caliper: ເຄື່ອງວັດແທກທີ່ມີຄວາມລະ:ອຽດຫຼາຍ.

85. vises: ເຄື່ອງຈັບວຽກ.

86. workholding jaws: ເຄື່ອງຈັບວຽກ.

87. wrenches: ກະ:ແຈມື.

MACHINE TRADES: Measuring Tools

1. bevel protractor with vernier: ເຄື່ອງວັດແທກມຸມຢ່າງລະອຽດ.

2. calipers: ເຄື່ອງວັດແທກຄວາມໜາ.

    hermaphrodite calipers: ວັດແທກຂ້າງໃນ-ນອກ.

    inside calipers: ວັດແທກຂ້າງໃນ.

    inside transfer calipers: ວັດແທກຂ້າງໃນແລ້ວເອົາເຄື່ອງວັດອັນ
    ອື່ນວັດອີກເທື່ອນຶ່ງ.

    outside calipers: ວັດແທກຂ້າງນອກ.

    outside transfer calipers: ວັດຂ້າງນອກແລ້ວເອົາເຄື່ອງວັດອັນອື່ນ
    ວັດອີກເທື່ອນຶ່ງ.

    vernier calipers: (reads .001) ເຄື່ອງວັດຢ່າງລະອຽດ.(ອ່ານ .001

3. center gages: ເຄື່ອງວັດສູນກາງ.

4. combination square with center and protractor heads: ເຄື່ອງວັດມຸມສ

5. dial indicator: .001 and .0001 ເຄື່ອງວັດຄວາມຫລວມ.

6. dividers: ເຄື່ອງມືແບ່ງໃຫ້ເທົ່າກັນ.

7. gage blocks: ເຄື່ອງວັດແທກຄວາມໜາເປັນທ່ອນບາງໆຫລາຍຂນາດ.

8. micrometers: ເຄື່ອງວັດແທກຢ່າງລະອຽດ.

    depth micrometer: ວັດຄວາມເລິກ.

    inside micrometer: ວັດແທກຄວາມກວ້າງຂ້າງໃນ.

    outside micrometer: ວັດແທກຄວາມໜາຂ້າງນອກ.

    thread micrometer: ວັດແທກກຽວ.

    vernier micrometer: (reads .0001) ວັດຢ່າງລະອຽດ(ອ່ານ .0001)

9. precision square: ເຄື່ອງທຽງມຸມສາກຢ່າງທ່ຽງທຳ.

10. protractor: ເຄື່ອງວັດແທກມຸມ.

MACHINE TRADES: Measuring Tools - (cont.)

11. **scales**: graduated in 64ths, 32nds, 16ths, 8ths, .10, 102, .01. ເປັນເຄື່ອງວັດແທກ ທີ່ ຄ່ອຍໆ ຫຼາຍ ຂື້ນ, ເປັນຂັ້ນໆ.

12. **sine bar**: ເຄື່ອງວັດແທກ ຄວາມເລິກໂດຍໃຊ້ ມຸມ ຕ່າງໆ.

13. **small hole gages**: ເຄື່ອງວັດ ຮູ ນ້ອຍໆ.

14. **surface gage**: ເຄື່ອງວັດ ໃຫ້ພຽງ.

15. **surface plate**: ພື້ນລຽບ ວາງໃນເຄື່ອງທີ່ໆ.

16. **telescoping point**: ຈຸດ ຈ່າກ ກ້ອງ ສ່ອງ ທາງໄກ.

17. **trammel points**: ຈຸດຂອງ ວົງວຽນ.

18. **vernier depth gage**: ເຄື່ອງວັດ ຄວາມເລິກ ຢ່າງລະອຽດ.

19. **vernier height gage**: ເຄື່ອງວັດ ຄວາມສູງ ຢ່າງລະອຽດ.

20. **wire standards**: (used for pitch diameter - 3 wires) ເສັ້ນ ລວດ ຂນາດ ມາດຖານ.